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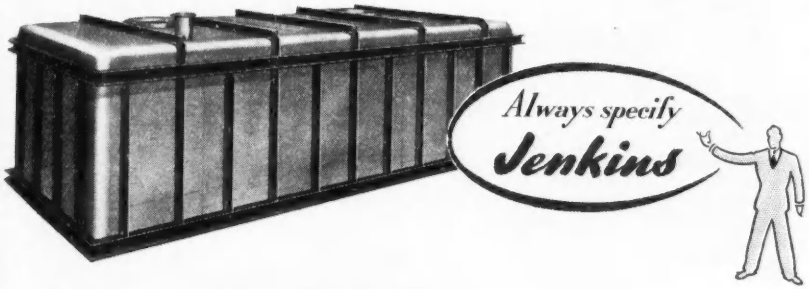


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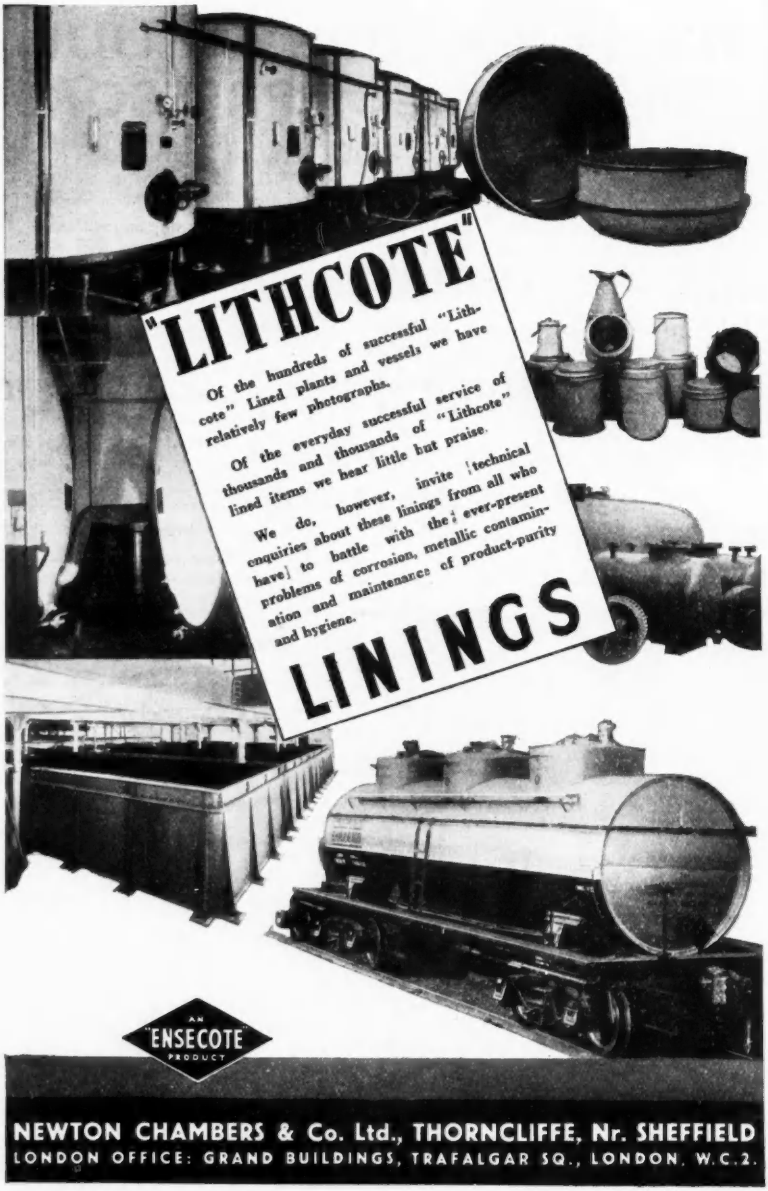
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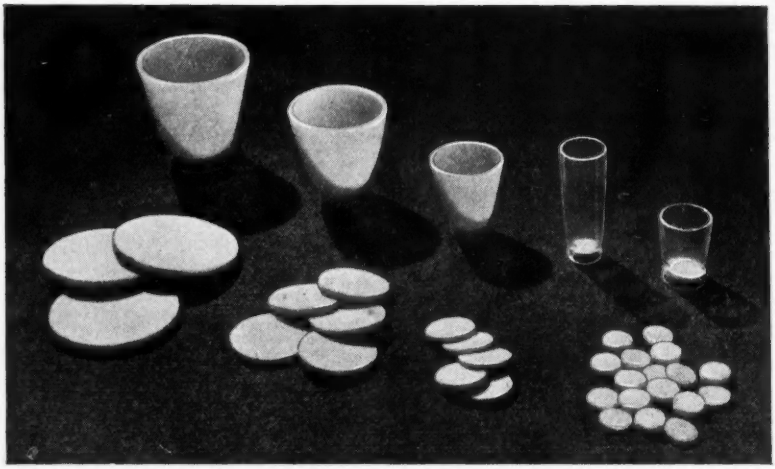

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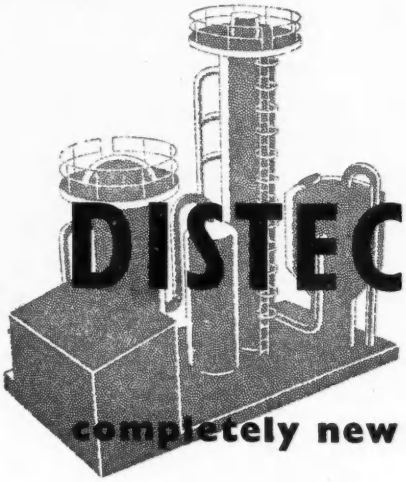


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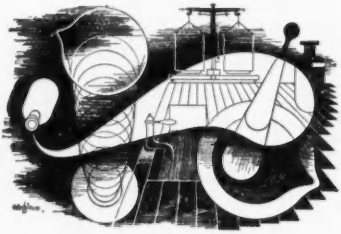

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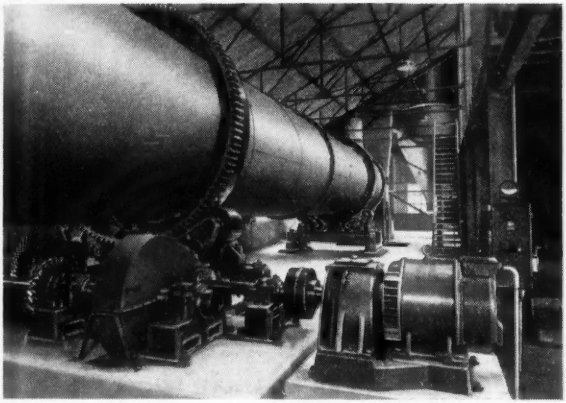

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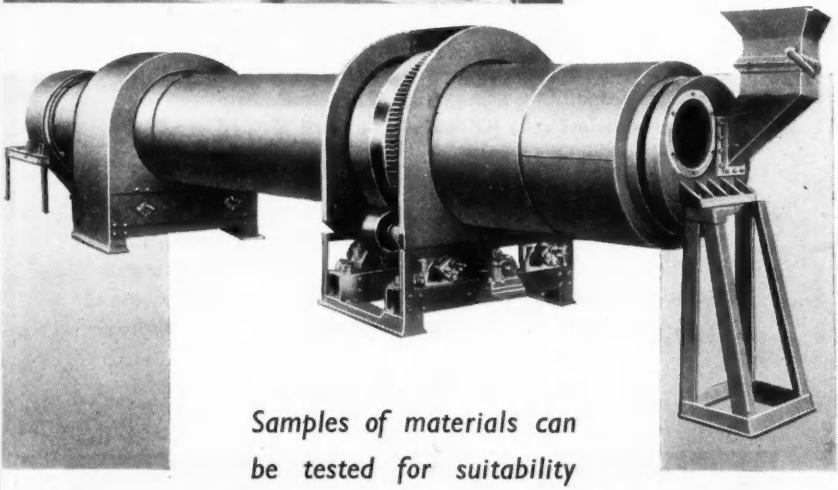

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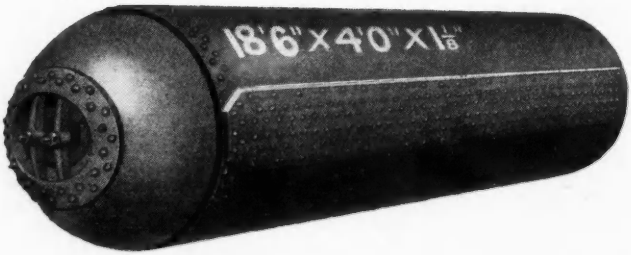


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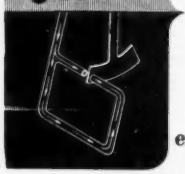

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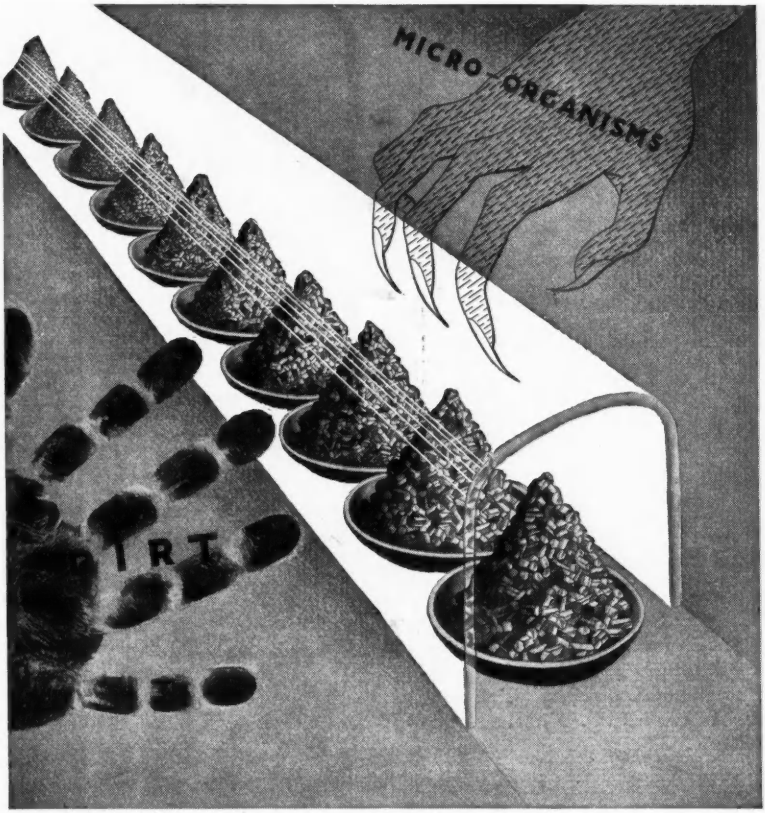


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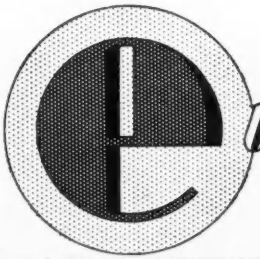

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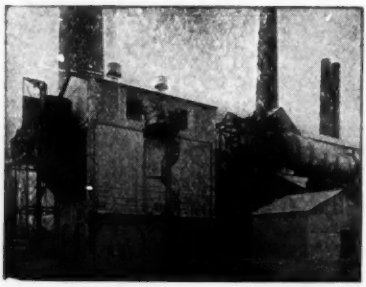

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No. 1563

25 June 1949

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# Clearer Chemical Notation

THE unending problem confronting the organic chemist, that of indexing the large amount of material collected by fellow chemists, is again brought into prominence by the publication of a second edition of Dr. G. Malcolm Dyson's book on "A New Notation and Enumeration System for Organic Compounds" (Longmans 10s. 6d.). The complexity of naming organic substances and, conversely, of being able to identify a substance by means of a name are illustrated by the following examples where we have two different names for the same substance: tetramethyl ethylene; 2-3 dimethy butene-2. Obviously, with more complicated structure, the number of possible names increases progressively as is instanced by the fact that 2,5 dimethyl benzyl chloride may also be called by three other names.

One way of overcoming the difficulty of having several names for the same compound is to refer to the compound in question by means of an ideograph or graphic formula. This is unambiguous but such a formula cannot be used in speech, its representation takes up a lot of room and it cannot be classified in index or list form. The publication of Dr. Dyson's book in 1947 was an attempt at overcoming these difficulties and providing a means by which each compound could be identified by a cipher suitable for mechanical indexing.

Two years ago the indexing of organic compounds by means of ciphers was a relatively new departure and, as stated in the preface to the second edition of this book, the first monograph was deliberately provocative and the principles of the new notation were set out in a tentative way to stimulate discussion and constructive criticism. The first edition aroused very great interest not only in this country but also on the other side of the Atlantic, and after several public lectures here Dr. Dyson was invited to present his system before the American Chemical Society. It is as a result of these personal interchanges of views, coupled with the suggestions and criticisms which have been forthcoming from all parts of the world, that the second edition has been produced. This is now presented in the form of a definitive proposal for an international system for delineating and enumerating organic structures.

Glancing through the second edition, it is obvious that the main general principles of the original notation have been retained and the two principal alterations are in the method of ciphering ring systems and in the arrangement of symbols within the operations. In the old system each aromatic ring, such as naphthalene or anthracene, was denoted by its own letter in the cipher. After considerable discussion in Atlantic City it was suggested by representatives of the Nomenclature Committee of the American Chemical Society that it would be better to abandon the principle of adduc-

## On Other Pages


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tion in favour of a more logical statement of the reticular system. This new method also takes cognisance of a method for naming organic compounds which was simultaneously being developed in the United States and at the same times does not entirely depart from the logic of the Ring Index.

The other major revision concerning the arrangement of symbols within the operation relates to the manner in which the size of carbon chains is denoted. Two side chains of length 4 attached to positions 4 and 5 of some previously denoted skeleton are now signified by the symbol $C_4$,4,5 instead of 4,5C4 as in the old method; although this may seem a small alteration, it becomes very desirable in view of the revision of ring citations, on account of the ease of manipulation of punched card data.

The present volume has been expanded to 138 pages and in this fuller edition detailed rules are to be found for indexing any compound. Throughout the text there are many examples of the way in which the ciphering system should be used and numerous tables are included of the ciphers corresponding to simple compounds and functional groups. A casual glance through the book may give the impression that the system is extremely complicated; this impression may be based on the circumstance that in some cases complex molecules have been chosen as examples. Some of these are more complex than one would expect to meet in everyday usage, but the fact that this new ciphering system is as applicable to complicated molecules as it is to simple ones is a very great factor in its favour.

The nomenclature and indexing of organic compounds has for so long been a stumbling block to the advancement of scientific knowledge that there should be no hesitation in commending this attempt at rationalising the position. Its success, moreover, bears witness to the co-operation between chemists and those responsible for making mechanical indexing and sorting machines, without which the evolution of this new system would have been impossible.

[*Summary of the first edition*, THE CHEMICAL AGE, 1247, **56**, 251-4.]

**Fire Damage to Dye Works.**—Fire on June 14 in Jopson Ashworth and Edmund's dye works, Market Street, Middleton, caused damage estimated at many thousands of pounds to the building, machinery and tons of dyed cotton yarn. Production will not be completely interrupted, as orders will be transferred to branches of the British Cotton and Wool Dyers' Association in Rochdale, Bury, Halifax, Bradford, and in Scotland.

# NOTES AND COMMENTS

## Trade Barriers

THE stultification of profitable activity of industry and commerce by a mass of controls, quotas and licensing systems is a familiar ill, from which there are small but encouraging signs of recovery here. But the epidemic was not confined to Great Britain and there remains all round the world an elaborate network of trade barriers and other limitations placed on foreign trade of which the constant reference in chemical market reports to the decisive influence which the availability or absence of foreign import licences wields is the commonest example. Much of this rationing of international exchange was inevitable, but attached to it is a great body of administrative machinery, "a maze of regulations and formalities which are in themselves a deterrent to conducting and still more to expanding international business."

## Seeking Agreement

THAT was the conclusion which has been reached by the contemporary congress in Quebec of the International Chamber of Commerce, which is renewing the battle joined long ago to sweep away some of the barriers to ready exchange of goods between countries. Since the Convention for the Simplification of Customs Formalities in 1923, what were fairly stiff fences at the world's ports have grown into the equivalent of barbed wire entanglements, with results which all exporters have good reason to deplore. Even worse, the stringent requirements regarding such things as determining country of origin or calculating *ad valorem* value vary from port to port and even in their interpretation by individual customs authorities. The successful exporter in these circumstances needs to be a mind reader, an international lawyer and several other things. The cordial good wishes of all victims of the system here will go out to ICC in its present campaign to persuade all member countries to find a way out of this legislative jungle with the aid of national importer-exporter committees and the formulation of whatever internationally standardised rules can gain acceptance. The ICC, however, holds out no false hopes that impediments deeply rooted as these are will be quickly removed. That is implicit in its recommendation "that a progress report should be sent each year (by the countries concerned) to the International Trade Organisation."

## Genetics—by Order

CHEMISTS as a group have not needed to go too deeply into the facts underlying the classic dispute about the Lysenko theories of agricultural genetics, whose wholesale acceptance the Soviet Academy of Sciences has done its best to make obligatory, losing some of its most distinguished foreign members in the process. Chemists, however, in common with all other scientists, may still have something to learn from this fearful example of what is liable to occur when the pursuit of science comes under the undisputed control of politicians—in this instance politicians of the most rabid kind. The ruthless "liquidation" of all the forces which did not unhesitatingly adopt the Michurin-Lysenko theory in biology, "based on dialectical materialism and on the revolutionary principle of changing Nature for the benefit of the people" has sickened scientific workers in every country in which the expression of opinion is still permitted, although many are still in doubt as to the full facts of the case. As a fair and scientific presentation of what they were and of the nature of pressure brought to bear by the new Soviet arbiters of scientific affairs, the article contributed by Dr. Julian Huxley, F.R.S., to the current issue of *Nature* (*4155*, 935-42) leaves little doubt that under present conditions, honest scientific inquiry in Moscow may be as hazardous as the propagation of heresy within the precincts of the Spanish Inquisition.

## An Indictment

THE Praesidium of the U.S.S.R. Academy of Sciences, when it decreed in August last year that the Cytogenetical Laboratory of Cytology, Histology and Embryology and the Laboratory of Botanical Cytology should be abolished passed 12 resolutions, the character of which leaves no doubt that ordinary scientific considera-

tions no longer weigh wherever the Praesidium holds sway, while slightly remoter ideals of science, such as the benefit of humanity at large, are not even considered. Of those facts Dr. Huxley's selection from the Soviet authorities' own words leaves no doubt. The agricultural experiments on which the new Soviet creed is said to have been based are known to have ignored the common precautions used to exclude irrelevant influences in all such experiments elsewhere and it is perfectly clear that no work, past or present, which might result in the emergence of facts conflicting with the approved Soviet line will be permitted in the U.S.S.R. or given a hearing if it emanates from without " the curtain." The authority for all the invective directed against " the scientific inconsistency of the reactionary idealist theories " of Mendel, Weismann, Morgan and, equally, any other worker unacquainted with the party line is the Central Committee of the Communist Party. All this travesty of scientific principles and objectives is, of course, no novelty under a system which significantly distinguishes between " Russian scientists " and " Soviet scientists." (The former are " bourgeois and anti-scientific.") It is well, however, that Dr. Huxley has rendered a full record of the facts for the enlightenment of those who have not the time, or perhaps the Russian, to study at first hand the evidence of this murderous attack on the very roots of scientific method.

## Whiting Research

THE laboratories of the Research Council of the British Whiting Federation—a recently formed research organisation—have been established at 249 Ampthill Road, Bedford (Telephone: Bedford 66917). Here the production properties and uses of whiting and other forms of processed chalk will be studied under the direction of Mr. G. E. Bessey, who was a principal scientific officer at the Building Research Station (DSIR), Watford, before taking up his present appointment as director of research at the new Bedford laboratories. Whiting has been manufactured for many years in this country from our own natural chalk, but hitherto very little original research has been done. Bearing in mind its extensive use in the manufacture of linoleum, rubber, paint, distemper, and, more recently, certain foods—it is being put into the current bread grist—it is thought that there is a wide field for investigation, particularly in view of the opportunities which should arise from the development of its uses overseas. There is already a considerable export trade in whiting from Britain.

## Money in Advance

IF the present Government should wish to defend itself against the frequent charge that it is profligate in the dissemination of " paper " in all its various departments, it could not do better than cite the practice of one of its sections which is the only source of information from its records, of a kind which is of general interest and is commonly published freely by a public relations officer or equivalent official. But, should one need to know what are this country's imports of whiting pigment, for example, one must not only pay for it, but pay in advance—about 4s. This charge varies, according to the number of minutes required to find and write down the information requested. But, as with most things in modern " controlled " life, there is a metaphorical queue in this particular Government department, and, having paid the fee, one is informed that the " goods " will be forthcoming in a few days' time.

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# The Steel Bill

### Nearly 100 Amendments

INDICATIONS that opposition to the Iron and Steel Bill has gathered force since the proposed measure was last before Parliament are the tabling of 98 amendments for the committee stages of the Bill, which opened in the House of Lords on Thursday, and the distribution this week by the British Iron and Steel Federation of a 62-pp. publication, " The Iron and Steel Bill—Some Arguments For and Against." In this the controversial ground on which the Bill was first presented and formidable arguments against its acceptance are presented.

Probably the most important of the amendments to be presented during the four days in committee in the House of Lords provides that the Act should not have legal force before October 1, 1950 (after the Election). Another urges that an Iron and Steel Prices Board should be set up.

# Ciba Science Centre

## International Foundation in London

THE belief that Great Britain leads Europe in scientific research and that London is the centre of the world led to the endowment and establishment of the Ciba Foundation which was officially opened at 41 Portland Place, W.1, this week.

The Ciba Foundation for the Promotion of International Co-operation in Medical and Chemical Research is unique in having as its primary object the stimulation of international co-operation, and its institution set up away from its country of origin.

Ciba, Ltd., of Basle, Switzerland, noted for its pharmaceuticals, dyes, and plastic manufacturing companies, has more than 50 years' experience in research in its Swiss laboratories, and latterly also in the U.S.A.

A high percentage of basic research is undertaken and the research team is headed by Dr. Max Hartmann, assisted by Dr. K. Miescher and Prof. Rolf Meier.

Original work of discovery and development by Ciba covers a wide field, including such preparations as Coramine (niketh-amide B.P.), Nupercaine (cinchocaine hydrochloride B.P.), Cibazol (sulphathiazole B.P.), the hormones, dial (allobarbitone B.P.C.), vioform, antistin, and privine.

### Lectures and Grants

Belief that fuller co-operation in scientific endeavour is essential, and that this is fostered most readily by personal contacts has always been held by Ciba, and an organisation to implement it was interrupted by the war. Trustees of the Foundation are Lord Beveridge, Lord Horder, Prof. E. D. Adrian, and Mr. Raymond Needham, K.C.

Informal conferences will be held from time to time to which small numbers of scientists will be invited, and lecturers from abroad will be asked to address selected audiences.

Grants will be made to younger men of outstanding promise and also to enable workers of this country to study methods of research abroad.

The trustees have agreed that, if accommodation in the centre is available, it may be placed at the disposal of the Medical Research Council, or other scientific body, such as universities, teaching hospitals, research institutes, etc., for purposes within the objects of the Foundation.

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**New London Office.**—The Clayton Aniline Co., Ltd., has opened a new London office in the north-east wing of Bush House, Aldwych, W.C.2. Mr. B. N. Symonds, of the headquarters sales staff, has been appointed London branch manager.

# Lace Industry Research

## Chemical and Physical Problems

TWO urgent problems with which the Lace Research Assocation is intimately concerned will be demonstrated at the stand of the Department of Scientific and Industrial Research at the Association's Nottingham Quincentenary Exhibition, which opens on Monday next.

Research is being carried out to try and find a satisfactory substitute for the graphite or "black lead" which at present is used in powder form to lubricate the lace-making machine.

The black dust tends to cover the factory, making conditions bad for workers. The lace itself may be soiled, particularly in tying up a broken thread. A thread of dark grey may run through the white of the finished material.

The search for a new lubricant, which must either be easily removable from the lace or has no effect on the dyeing and is not harmful to the workers, is likely to prove long and exhaustive. Tests will be made at every stage up to full-scale trials on a working lace machine before any new lubricant can be recommended.

The adverse effect of weather on the Jacquard strings which activate textile pattern-forming mechanism is also receiving the attention of the Lace Research Association. Temperature and humidity cause the strings to vary in length, thus producing flaws in the design.

Attention is being directed to find new materials for strings to the Jacquard which will not stretch or shrink with changes of weather. New synthetic fibres are being investigated in the laboratories and will be tested in the factories. Advantages of the new strings will have to be balanced against any increased cost compared with the old type.

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# Opportunities for Chemists

AN active year was reported by the Bristol and South Western Section of the British Association of Chemists at its recent annual meeting.

Opportunities for chemists in industry were the subject of a short series of lectures held in the chemistry department of Bristol University, while encouragement to future members of the profession was given in a number of talks addressed to Bristol Grammar School on chemistry as a career.

Three papers of interest presented during the session were "The Paint Chemist," by H. L. Howard; "Petroleum and Chemicals from Petroleum," by M. G. Watson; and "The Coal Utilisation Industries," by M. Barash.

# Widespread Production Increases in France

## Chemical Industries Overcoming Post-War Difficulties

DESPITE social difficulties, shortage of electric power and the coal strikes, production in the French chemical industry exceeded, in 1948, the average 1938 figures by between 20 and 30 per cent. With the exception of strategic minerals such as thorium and cerium and certain non-ferrous metallic ores, including zinc, lead and copper, raw materials were not short.

### American Supplies

Sulphur became rare towards the end of the year but shipments from America saved the situation. Phosphates, chromite, baryta, nickel and cobalt minerals and borates arrived in sufficient quantity, and arsenical anhydride, which was short at the beginning of 1948, was imported. Packaging, particularly glass cylinders, was more readily available in 1948.

Sulphuric acid production increased by 15 per cent over 1938 figures. Hydrochloric acid production increased by 13 per cent. Nitric acid, however, diminished, due to the destruction of the Lorraine mines plant. Synthetic ammonia production increased from 165,000 tons in 1938 to almost 200,000 tons in 1948, and sodium carbonate from 40,000 tons (monthly average) to 67,000 tons.

### Widespread Improvement

Solid caustic soda increased from 10,000 to 18,000 tons (monthly average). Caustic potash increased from 12,000 to 19,000 tons and potassium carbonate developed to a like degree. Chlorides production increased from 48,000 tons to 66,500 tons. Bisulphites production increased by 64 per cent, hyposulphites by 65 per cent and sodium sulphide by 64.5 per cent.

The electro-chemical industry also developed in an upward direction. Although calcium carbide increased by 60 per cent, however, it was impossible to satisfy all demands.

Development of organic products was even more striking. Phenol production increased and production of naphthol and phthalic anhydride were doubled. Production of formaldehyde was able to satisfy all needs. Despite an almost doubled production, ethylene derivatives were unable to meet demands. A 30 per cent increase in dyestuffs production was noted.

### Exports Resumed

Pharmaceuticals output exceeded that of pre-war and by the end of 1948 controls on export were lifted. Imports of streptomycin accounted for 95 per cent of credits used for imports.

Owing to shortage of raw materials, the glue and gelatine industry was unable to increase production. Synthetic glues with a urea-formaldehyde base were developed.

Since the beginning of February there has been a general falling off in sales, but this has not yet affected the French chemical industry.

## FRENCH COMPANY RESULTS

THE Compagnie Français des Pétroles, France's premier oil company, which administers the French share in the Iraq Oil Co., Ltd., reports a gross profit last year of 1571 million francs, against 935 million francs in 1947. An unchanged dividend of 8 per cent has been declared on the new share capital of 5222 million francs.

The Standard Française des Pétroles, the French subsidiary of the Standard Oil group, reports a marked increase in its gross profit in 1948 from 2883 to 7124 million francs.

These advances correspond with even larger increases by British refineries.

The Société des Usines Chimiques Rhône-Poulenc, the French pharmaceutical company, reports trading profit of 979 (332) million francs in 1948. By a recent share issue, the company's share capital has been doubled at 1263 million francs.

## FOOD SCIENCE STUDY

NEW courses in applied physics, food science and microbiology were announced at a recent meeting of the governors of the Royal Technical College, Glasgow.

In many industries, it was noted, physics tended to become nearly as important as chemistry, and as a result of the development of the food industries of this country during the war, a great deal of food processing was being undertaken.

There was considerable scope for the application of scientific methods. It was felt that the new courses would be valuable to help in dealing with problems which frequently occurred in physics, chemistry and microbiology. Research equipment of a specialised character had been ordered.

The demand for technical staff from industry still exceeded the numbers being produced by the colleges.

# Co-operative Paint Marketing

## Widespread Collaboration for Exports

IN his presidential address to the Paint Manufacturers and Allied Trades' Association at the annual luncheon in London last week, Mr. R. B. E. Jackson reported that great interest had been aroused in North American countries by the combined export drive of 130 member firms which had sunk their individuality, adopted common formulæ, colours and packing and were selling to overseas markets under one name. "I hope," said Mr. Jackson, "that this unique development in British industry will soon receive the reward of its enterprise by its proportionate share of exports to dollar markets. As the great need to-day is for export to hard currency countries, I suggest that other suitable industries might well adopt the same idea."

As indicating the disinterested spirit of collaboration animating the industry, Mr. Jackson quoted the instance of one firm, which had been trading individually for 300 years and was content to market its products anonymously under the general scheme.

"While the seller's market has gone," said Mr. Jackson, "the future holds great possibilities, but to develop these new products and new ideas, we must be firm believers in private enterprise. The industry was built by private enterprise, and it can only survive by private enterprise. It is not sufficient to pay lip service to it.

### Informing Workers

"I do not think we encourage nearly enough discussion groups within our own works. This may not be altogether possible with large employers of labour, but when we realise that the smaller firm is still responsible for approximately 65 per cent of the total production of this country, it could be made possible by employers such as ourselves.

"One of the first things which we should tell them, is that profit is not necessarily immoral, secondly—how small a proportion of profit goes in directors' fees and dividends."

Lord Rochdale, president of the Manchester branch of the National Union of Manufacturers, said a solution must be found to the problem of Government expenditure and consequent high taxation which took 45 per cent of the profits that should be ploughed back into business. Either Government expenditure must be cut or we must all produce more; and the prospect of any substantial saving was small.

"The question that does arise here," said Lord Rochdale, "is that—while all these great items of expenditure have each in turn been approved by the country in detail—does the ordinary man in the street realise the extent to which they cost money, that none is free; does he realise the immense total to which this takes Government expenditure? and does he really value sufficiently what he gets in for all this to make it worth his working two days for the Government for every three days he works for himself? For myself I doubt it."

(*Continued at foot of next column*)

# Steel and Aluminium

## Uneconomic Substitution for Timber?

THE claim that to reduce timber requirements steel and aluminium were being purchased from dollar sources, possibly at greater cost than would be required by the natural building material was made before a recent meeting of the Parliamentary and Scientific Committee. The speaker, Mr. P. O. Reece, director of the Timber Development Association, told the committee that, while timber using industries were operating much below their capacity, he observed that large quantities of steel and aluminium were imported every year and last year it was decided to import cement. He believed that all the steel used last year as a timber substitute came in one form or another from the U.S.A.

Recently it was announced that aluminium schools were being built to save scarce materials. Four-fifths of the aluminium we use was imported, nearly all from Canada. Here was another case where the substitute material was bought from the same country that might otherwise have provided us with the timber "at about one-quarter of the cost of the aluminium."

We were buying precisely the same proportion of our goods from the dollar countries that we bought before the war, but were spending our dollars on different things. For every dollar's worth of timber we bought from Canada, we could release at least four dollars' worth of steel.

# MORE SOLVENTS REDUCTIONS

FOLLOWING last week's price reductions of acetates and alcohol (THE CHEMICAL AGE, *60*, 883), Shell Chemicals, Ltd., now announces that reduced prices will apply to deliveries (10 ton lots) of its solvents listed below, made on or after June 13, 1949:—

| | Per Ton | |
|---|---|---|
| | New Price | Old Price |
| Methyl ethyl ketone ... ... | £100 | £105 |
| Methyl isobutyl ketone ... ... | £140 | £160 |
| Secondary butyl alcohol ... ... | £120 | £138 |
| Methyl isobutyl carbinol ... | £145 | £154 |

# New Dyestuffs Supply

## Production of Cheaper Intermediate

THE successful operation at their Hull works of new plant for large-scale production of acetoacetanilide for the dyestuffs industry has been reported by British Industrial Solvents, Ltd. The company states that the yield is well up to the high standard required in this class of organic intermediates, which is particularly of importance in the manufacture of fast dyes of the Hansa Yellow type.

The new Bisol process derives added interest from the fact that it effects economies which have been reflected in lower prices, which according to the B.I.S. company should have a good effect on dyestuffs prices, which in some departments have been too high to compete with foreign supplies.

W. J. Bush & Co., Ltd., are distributing the acetoacetanilide in the United Kingdom.

# EXPORTS EXCEED £8 MILLION

THE Trade and Navigation Accounts of the United Kingdom disclose that in May total exports by chemical industries were of a total value of £8,091,749, compared with £6,983,784 in the same month of last year. This is the first occasion since January that the total has exceeded £8 million. The total value of export chemicals, other than drugs, dyes and colours, was £4,504,460 (£3,872,561 in May, 1948). Drugs and medicines exported were worth £1,790,990 and dyes and dyestuffs £757,876. Paints and pigments earned £1,038,423.

# Purified Air at High Pressure

A high-precision air rectifier and reducing valve unit which effectively removes impurities from high-pressure air and delivers dry clean air has been designed and produced by the Hymatic Engineering Co., Ltd., of Redditch, Worcestershire. Designed with special attenton to finishing and spraying needs, it gives pure air at the pressure required for correct atomisation, according to the material and the spraying effect required. The high-pressure supply air is introduced at high velocity through a specially designed orifice, mechanical separation of the impurities being effected centrifugally by a downward rotating spiral motion. There is a second stage of purification by an upward passage at reduced velocity through an effective "scrubbing" medium. The reducing valve element operates smoothly and without pulsation by a system of continuous counter balance where a sealed piston reacts to the low pressure air to admit a compensating supply of air from the rectifier.

# Rôle of Polyphosphates

## Facilitating Water Dispersions

A NEW theory to explain the action of polyphosphates in promoting full dispersions in water of clay and similar substances has been put forward in the U.S.A.

Dr. John Van Wazer, of the Heyden Chemical Corporation, of Rhode Island, told the 23rd national colloid symposium of the American Chemical Society that the action of the polyphosphates, of which the most effective were those corresponding with sodium phosphate glass, was to break down the attractive forces which bind together clay particles into tangled rope-like structures when suspensions in large quantities of water are made.

Dr. Wazer also helped to make clear the important rôle polyphosphates are capable of playing, by reference to the basic behaviour of clay particles. The polyphosphates have become extremely useful in industry for thinning clay and pastes. They are added to drilling muds, the clays used to lubricate oil well drills and to float away the rock as it is cut by the drill. They are also employed to thin pastes of titanium dioxide and a wide variety of viscous materials.

Dr. Van Wazer noted that his experiments showed that fine particles of clay, mixed with just enough water to make a workable paste, are held together by surface tension. When more water is added, the particles form the widely separated rope-like structures mentioned, the surface tension of the water holding the ropes together. When polyphosphates are present, however, the attractive forces are overcome and a relatively even dispersion is brought about.

# Mobile Air Drying Equipment

A number of completely self-contained and mobile air drying equipments, claimed to be the first of their kind, have been ordered by a Government department.

The units are mounted on trailers for towing and, disconnected, each is completely self-contained, and will deliver up to three separate supplies of dried compressed air.

Produced by the Magnetic Equipment Co., Portsmouth, each unit comprises a petrol driven air compressor. Particular attention has been given to the filtration and silencing of the engine and compressor and, after being drawn from the compressed air receiver, the air is passed through an oil trap to remove all oily vapour before passing to the adsorbent beds.

The adsorbent dryer is of the double-bed, single-stage type under manual change-over control, one lever operating two valves only.

# The Film in Science and Industry

## Wide Uses for Publicity, Information and Training

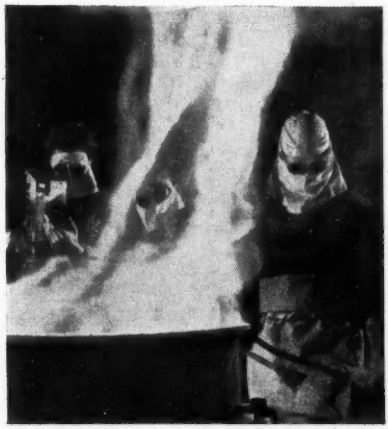
by K. D. OUTWIN

THE importance of film as a medium of world-wide entertainment is generally recognised—about 235 million people were estimated to be attending the world's cinemas weekly in 1939. Its extensive use as a disseminator of fact and handmaiden of science is a factor of growing importance, full use of which has yet to be made.

At least 38 countries are now using special purpose films. Functioning in many of them are institutes or scientific film societies, collaborating with appropriate sections of education, science and industry.

In the international sphere the increasing importance of the factual film is evident. The United Nations Film Board has commissioned the production of several documentaries suitable for world distribution, while UNESCO is concerned with all aspects of the cultural and scientific film.

In response to war needs, many countries increased production. As early as 1943 the War Department of the U.S.A. had 10,200 training films and 11,890 training shorts. In Britain, while approximately 300 films had been produced professionally between the wars, from 1940-45 the Films Division of the Ministry of Information alone produced 727.



*[Courtesy, I.C.I., General Chemicals Division*

**Camera-man wearing protective clothing during shooting of an I.C.I. film in the General Chemicals Division**

*Courtesy, Evans Medical Supplies, Ltd.*

**Inoculating media with cultures**

The evidence of so much time and money expended prompts the question—"How efficient is film for instructional purposes?"

To answer this same question the Director of Training and Staff Duties, Admiralty, conducted an experiment involving 732 men. This consisted of giving instruction in one subject by three different methods. These were (a) normal practical instruction; (b) instruction with the aid of film strip (*i.e.*, still pictures printed in sequence on film for projection; and (c) instruction by film.

The men were then given a test. From the result it was concluded that film was better than the average normal methods of instruction, with or without the aid of film strip. Though one example, of course, does not furnish conclusive evidence in favour of film, it may be noted that the Service Departments of the U.S.A. reached similar conclusions.

### Public Relations

It is proposed here briefly to survey the use of the scientific film as applied to public relations, internal relations and training, and research. The term "scientific film" may be defined broadly as (a) an exposition of science (or process within industry) for the layman; (b) an instructional film for the semi-specialist or student; and (c) a research or record film (often esoteric) made, or supervised, by scientists.

Very little film production was undertaken by industry until 1929. In that year

the Empire Marketing Board commenced production concerned with a variety of subjects connected with industry, scientific research and Empire communications. The results inspired several of the big industrial groups (*e.g.*, the Gas Association and Anglo-Iranian) to launch limited production programmes designed to further public relations and create a modicum of prestige.

The subjects dealt with ranged from child welfare to communications and, though they were shown chiefly to limited audiences, a few were commercially successful—*e.g.*, "Contact," for Shell-Mex and B.P. played in some 1500 cinemas.

In 1934 the Shell Refining and Marketing Co., Ltd., formed its own production unit which from the outset concentrated on treatments that simplified mechanical and scientific processes (*e.g.*, "Distillation").

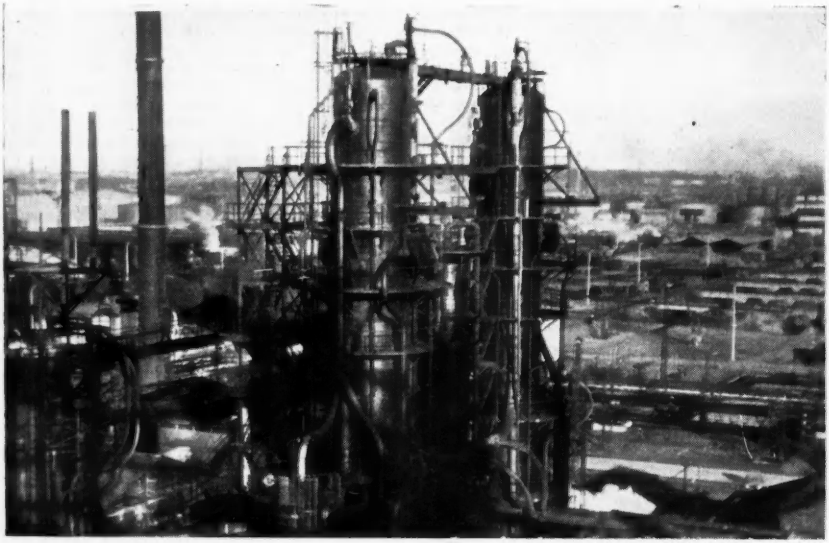
Since the war more films have been made for specialised audiences by all sponsors and consequently their subjects are treated more scientifically. Imperial Chemical Industries, for instance, has created a library of films on agriculture, veterinary science, school chemistry and medical subjects. These include a series on Health of Dairy Cattle; The Story of Penicillin; Catalysis in the Manufacture of Sulphuric Acid; and a series of eleven films on the Technique of Anæsthesia, for medical audiences.

Shell Oil Co. has made and are making films in colour on agricultural subjects, while the British Gas Council has a series on the production and use of its products. The film output of firms and organisations such as these is indicative of the present trend towards a policy of regular production.

## Internal Relations and Training

In order to create interest and thus increase efficiency, large industrial firms are employing films to demonstrate the work of one section to another. I.C.I. has in production a series of films that will cover the activities of each of their 11 divisions (*e.g.*, "Rock of Industry," for the Lime Division, illustrates the use of limestone in the manufacture of iron and steel, bleaching powder, agriculture, etc.).

The training of new entrants to industry—both in the explanation of scientific processes and the scientific approach to technique and work—can be considerably quickened by the film; that was proved during the war both here and abroad. In the U.S.A. 4 million servicemen are said to have been trained in the handling of machines and equipment in a sixth of the



[*Courtesy, Shell Photographic Unit*

**Cracking unit of a Shell distillation plant, exemplifying the impressive type of overall view in which the industrial film excels**

time taken by soldiers during World War I. In Britain during the war, two or three hundred training films were produced for the Services annually, and the Ministry of Supply also developed the technique for factory instruction. But industry has so far made only limited use of this type of film (*e.g.*, "The Single Point Fuel Injector"). Not all can afford the time and money necessary to develop suitable treatments of a particular process.

## Research

As a research tool the cine-camera has proved a useful—often indispensable—instrument in the hands of scientists It can accelerate or decelerate growth or movement; combine with the microscope and the telescope to magnify natural and mechanical processes; and be placed in positions quite impossible to a human observer.

The film camera was used experimentally for research many years before the entertainment film appeared. In 1897 Dr. Macintyre, of Glasgow, made a kine-radiographic film of a frog's leg, and in 1909 Dr. Comandon pioneered cine-micrography in the examination of venous blood circulating in a tadpole.

To-day similar work, but of a more complex character, is being executed by scientists, such as Dr. Hughes, of Strangeways Laboratory, who employs the time-lapse method to study living cells by means of polarised light and a phase-contrast microscope. By using the lapse technique—whereby single exposures are made at regular intervals—otherwise invisible movement may be analysed.

To study faulty machinery at speed or the explosive properties of gases, among other things, the slow-motion camera, running at speeds up to 3000 pictures per second is used. The research in physics has been aided by the use of film emulsions sensitive to the infra-red, ultra-violet and X-rays.

Time and motion study provides another investigating field for the camera. The worker whose movement is to be analysed is photographed—with a microchronometer

[*Courtesy, The I.C.I. Magazine*

**I.C.I. film unit at work during the production of the "Rock of Industry" film**

also in the picture—and the motion of each hand and limb is studied separately and applied to an analysis sheet.

Besides the research departments of industrial concerns work of this nature is carried out in the laboratories of universities and other institutions. For example, the Sir William Dunn School of Pathology, Oxford; the Strangeways Laboratory (mentioned above); the Cavendish Laboratory, Cambridge, where Sir Laurence Bragg made the metallurgical research film "Bubble Model of a Metal Crystal," which illustrates the intercrystalline boundaries and plastic flow in metals by using a two-dimensional model. Metallic properties such as annealing are also shown.

## Production and Distribution

Prior to 1939 many concerns had sponsored one or two films which for various reasons were failures, and because of this there are no doubt to-day many executives who view film production with a sceptical eye. They contend also that, whether successful or not, the making of a film requires the expending of time and money that they cannot afford.

The failures were due in many cases to the sponsors having omitted to ask themselves (a) who will be the audience; (b) how much will it know; and (c) what is the film expected to teach?

It is also essential that co-operation between sponsor and producer should be close. The producer, director and scenarist in a professional unit are often confronted with technical and scientific aspects of industry that are extremely hard for the lay mind to grasp. Because of this, industrial and other organisations have used their own amateur resources in preference to a professional unit, contending that their specialist knowledge outweighs their lack of technique.

"Atomic Physics" (G.B. Instructional)—one of the most noteworthy in the catalogue of scientific films—provided an example of complete liaison between scientist and layman. To survey the development of atomic physics from the theory propounded by Dalton in 1808 to the discovery of uranium fission was a formidable task. During the two years of research and production, assistance and advice were given by many eminent men including Prof. J. D. Cockroft and Prof. Einstein—the latter appearing in special scenes of the film—and by several distinguished organisations, including the Royal Society, the Royal Institution and the Atomic Scientists' Association.

In summary, it may be said that sponsors should be cinematically informed and producers industrially and scientifically informed. If the above conditions are satisfied a film is more likely to succeed in its purpose.

The initial planning competed, the sponsor has technical points to consider Should the film be made in colour or monochrome? Sound or silent? Standard or sub-standard? In connection with colour, it is interesting to note that during the war it was proved that—other things being equal—an average man remembers coloured things from 15-25 per cent better than black and white.

The use of sound is general to-day, and only when a film is planned as an adjunct to a lecture is it silent. The great improvement in 16 mm. sound projectors has led to a wide use of the sub-standard size, due to ease of handling in lecture rooms, etc.

The public presentation of the commercial-industrial film is an art in itself; the system adopted by Shell B.P. Farm Service is worth noting. The showing begins with a general interest film (possibly a two-reeler). The lecturer then discusses his subject, using film strip and wall charts to explain technical points; or alternatively silent films can be used. Another interest film closes the lecture.

Shell is using two new mobile units fully equipped with projectors, etc., each carrying a crew of two—lecturer and projectionist—for serving Young Farmers' Clubs and similar organisations.

## Outlook

The difficulty experienced by small firms in financing suitable films has led the Scientific Film Association to propose a scheme of joint-sponsorship. This would enable small concerns to procure films on subjects common to their interest (*e.g.*, machine-tool operating) at comparatively small expense.

To assist in the interpreting of industry to the public a non-profit-making organisation known as Aims of Industry has been formed. It has so far catalogued existing information concerning industrial films and plans to distribute them by mobile vans. It contemplates producing films also. The Central Office of Information controls the production and distribution of scientific and documentary films for Government departments.

The Department of Scientific and Industrial Research is experimenting and developing the use of films.

Chemistry and many other scientific subjects have received scant attention from the cine-camera; yet the outlook is encouraging, and to a future generation the factual and scientific film may be as much a part of life as the fictional film is to the present generation.

# MINERAL PIGMENTS OF SOUTH AFRICA

## Revaluation of Many Known Deposits

THE reintroduction of import control in South Africa has again directed attention to raw materials and secondary industry, which will help to reduce the deficiencies resulting from the enforced curtailment of overseas supplies.

Paint manufacturers are already taking considerable advantage of the various types of natural mineral pigments which occur throughout the Union. These have been described by the South African Department of Mines. They include ochres, oxides, umber and amorphous graphite or graphite shales, all of which are mined in the Union.

In addition, pigments made directly from ores, such as zinc oxide, ultramarine and chromium pigments, are manufactured locally.

The possibility of further developments in production of mineral pigments was discussed in a recent issue of *The South African Mining and Engineering Journal* (*60*, 1). This notes that, besides the deposits being worked at Riversdale, there is a large unexplored potential ochre-bearing area, evidenced by the presence of the white clays and highly altered Bokkeveld shales.

There is every possibility of other workable deposits being found in the same area, and that further quarries will be opened up if the demand continues. Red ochre occurs in association with the yellow in some deposits in this district.

Within the pockets of ochre the material is not everywhere of uniform quality and, on the average, for every ton of first-grade ochre at least three tons of second- and third-grade material are produced. There is not much demand for lower-grade ochre, but recently some uses, other than in paint manufacture, have been found.

Many other occurrences in the Cape Province, Natal and the Transvaal have been worked intermittently or samples have been tested, but in most cases they have been lacking in one or more of the requisite qualities for a good mineral pigment.

Deposits of yellow and red ochre similar to those in the Riversdale district, but which apparently do not contain yellow ochre of the same high quality, are found elsewhere along the southern coastal belt of the Cape Province.

Occurrences of red and yellow ochre and sienna have been reported from near Gamopedi in the Kuruman district. The quality of the yellow ochre particularly was found to be good, but the locality was too remote to justify exploitation.

Eight miles south of Cyferbult station on the Zeerust railway are extensive deposits of red and yellow ochre which were worked more than 20 years ago, the yellow ochre, particularly, being of good quality.

It is considered that an increased local demand will no doubt bring about the exploitation of further occurrences, accessible to the various consuming centres in the Union, even if the quality of the pigments is not sufficiently high for them to compete successfully in overseas markets.

## PYRENEES PHOSPHATE

ALTHOUGH French lime phosphates are unlikely ever to offer serious competition to North African phosphates, or their extraction to reach the record figure of 600,000 tons of 1900, the cost of transport from Tunis and Morocco is so high that French products are once more arousing interest.

Various attempts at exploitation have been made, notably in the Haute Garrone and Ariege. The Ariege seams have yielded useful tonnages in areas no more than 5 kilometres from the railway. If a phosphate industry does develop in the Pyrenees, this is the region which offers best conditions.

Secondary uranium ore has been found at several points in the Massif Central, which suggests that primary minerals of the pitchblende type must exist below the surface.

## CANADIAN URANIUM

URANIUM is attracting the attention of Canadian prospectors for the second year running, and there are indications that Canada may become one of the largest producers of the mineral. Primary hopes are directed at new properties of the Government-owned Eldorado Mining and Refining Co., Ltd., which is undertaking the biggest development programme for uranium in Canada. The company has been producing pitchblende concentrate from its mine at Port Radium, on Great Bear Lake, since the middle of the war. The new development is in the goldfields area of Northern Saskatchewan. During the summer 200 men will be working on this property and about 30,000 ft. of diamond drilling will be done. By next summer it should be possible to make a close estimate of the deposit.

# U.S. COAL GASIFICATION

## A Fresh Stage in the Coal-Oil Experiments

IMPORTANT data on gas synthesis are confidently expected to become available following the completion, reported from Louisiana, Missouri, U.S.A., of the equipment for the coal gasification phase of the gas synthesis demonstration plant sponsored by the U.S. Bureau of Mines (THE CHEMICAL AGE, *60*. 622-3, etc.).

The latest addition to the large assembly, which is expected to contribute largely to the solution of America's liquid fuel problems, will consist of four distinct phases: (1) coal gasification; (2) gas purification; (3) hydrocarbon synthesis; and (4) refining of of products.

### Refining Phases

Coal gasification is the only phase of the process concerning which there is no reliable American operating data available. For this reason, priority has been given to this phase of the construction, and test runs will be made in this unit while the purification synthesis and refining phases are being completed.

In the gasification section, pulverised coal injectors and a gasifier developed by the Koppers Co., Inc., permit the use of any coal from anthracite to lignite. The run-of-mine coal is first crushed, then dried and pulverised and conveyed pneumatically to a storage bin. From the storage bin it is fed to the coal injectors where it is picked up by an oxygen stream. The mixture is then introduced into the gasifier through central nozzles at each end.

Highly superheated steam is introduced separately in an annulus surrounding the coal nozzles. Oxygen for the process is supplied by a Linde-Frankl plant which was brought from Germany, reconditioned and erected on the plant site.

### Synthesis Gas

The reaction in the gasifier between the steam, oxygen, and coal produces a raw synthesis gas containing approximately equal amounts of carbon monoxide and hydrogen, and small amounts of carbon dioxide, hydrogen sulphide, and nitrogen. The synthesis gas is then washed and cooled and passed through electrical precipitators to remove the final traces of dust.

After dust removal, the gas goes either to a gas holder or to the synthesis gas compressors. As the gas must be compressed for synthesis, it is more economical to do so before the removal of sulphur compounds to permit purification under pressure. The bulk of hydrogen sulphide present is removed by scrubbing under pressure with ethanol-amine solution.

The scrubbed gas is then passed through iron oxide towers to remove the remainder of the hydrogen suphide and through towers containing activated charcoal to remove any thiophenes, hydrocarbons, carbon sulphide, or gum formers that may be present.

The final purification step, which utilises the Koppers hot purification process, consists of passing the gas through towers containing hot alkalised iron oxide. This step removes any organic sulphur compounds still present.

The successful operation of the synthesis process depends upon complete sulphur removal, since all the active catalysts known and available at present are extremely susceptible to sulphur poisoning.

After thorough purification, the gas is ready for the synthesis reaction. This is carried out in either a unit known as an internally cooled converter and/or in a slurry type reactor—the Lamo process. The internally cooled converter differs from the Lamo converter in that it provides for externally circulated coolant oil through a fixed bed of granular catalyst; in the Lamo reactor a finely divided catalyst is kept suspended in the coolant oil by violent internal circulation.

### Products

In the converter, under designed conditions of temperature and pressure and in the presence of a catalyst, the hydrogen and carbon monoxide in the synthesis gas combine to form crude petroleum, diesel oil, waxes, alcohols, and hydrocarbon gases, with a residual carbon dioxide and water.

The petroleum, diesel oil, some vaporised wax and coolant oil are condensed out of the gas stream, as well as a water solution of alcohol. The alcohol water solution is separated by gravity prior to oil distillation. The uncondensed gas, together with fresh feed gas, and coolant oil from the distillation section are recycled to the converter.

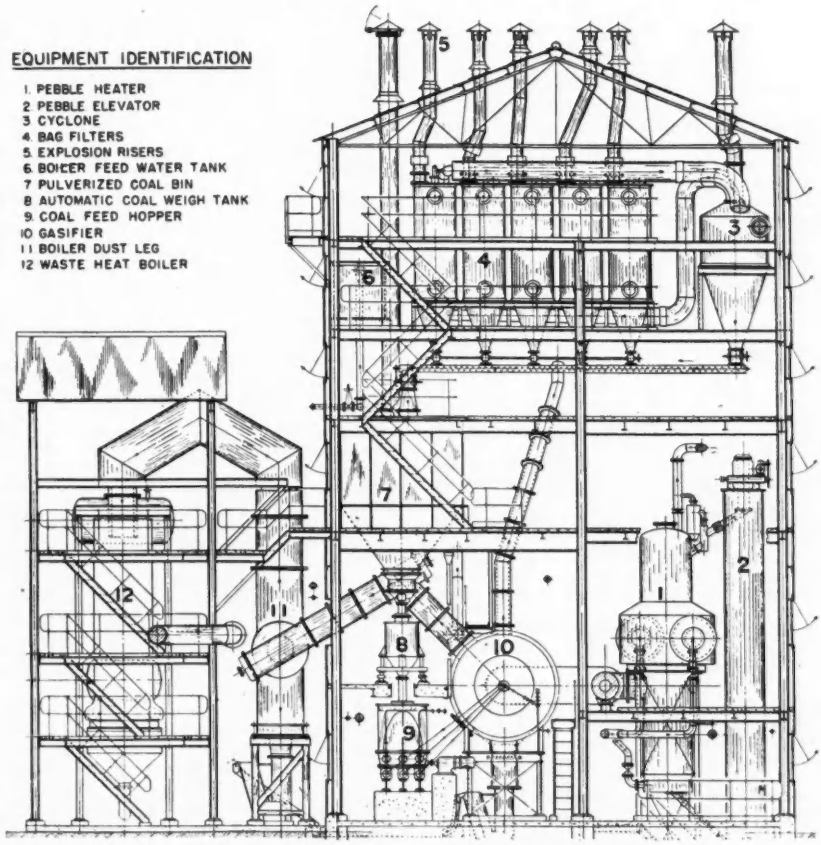
Some of the coolant oil is bled from the converter for distillation to remove the high-melting-point waxes which, if allowed to accumulate, would foul the catalyst and decrease the efficiency of the process. The heat of reaction produced is recovered in the generation of steam in a waste heat boiler.

The coolant oil withdrawn, with oils condensed from the gases leaving the converter, are sent to the distillation units for final refining. The oils are first separated into petroleum, diesel oil, coolant oil, and wax.

The petroleum fraction is treated and blended to produce a stable, sulphur-free petroleum. The diesel oil is also treated to improve its stability and ignition qualities.

All four phases of the gas synthesis represent a very advanced stage in instrumentation and automatic control. Operation and control are as nearly automatic as possible, to maintain maximum capacity, efficiency and safety. Instruments such as pressure controllers, temperature recorders, gas analysers, gravitometers, and flow controllers, as well as with signal lights and warning horns, enable the operators to observe and control practically all operations.

The various systems which make up the gasification plant and the equipment in them are so interlocked that a failure of any kind will shut down that system or, in some cases, the entire plant. A master push-button is also provided which will set in action controls to shut down the whole gasification plant in an extreme emergency. Many problems were met and overcome in the development and installation of the highly complex instrumentation. However, the comprehensive information on plant operation which the use of these instruments will provide is alone expected to justify their presence.




**Sectional view of the entire gasifier installation which the Koppers Company has produced for the Bureau of Mines study of synthetic liquid fuels**

# RATE OF FLOW CONTROL

## Methods of Measurement in Some Chemical Processes

by LEO WALTER, Dipl. Engr., A.M.I.Mech.E., M.Inst.F., etc.

AUTOMATIC control of the rate of flow of gases or of liquids is based on mating the characteristics of the control instrument with the process characteristics. A flow which is easily controllable by readjusting valves or dampers by hand will usually yield more readily to application of an automatic control instrument. On the other hand, control of flow by hand might be difficult, and consequently this less controllable problem will require a more elaborate automatic type of controller.

### Pressure Conditions

Controllability of rate of flow depends to a great extent on load fluctuations and pressure conditions in a pipeline. Generally, a flow process has very little capacity; a change of flow follows repositioning of a control valve very quickly. Time lags from the process itself—which can be considerable in control of heat flow—are negligible. The instrument time lags are therefore decisive for achieving accuracy of control. The design and function of the controller itself is accordingly a subject worthy of close study.

Any type of head meter for rate of flow using differential pressure as the measuring impulse can be adapted for control purposes by the addition of a control mechanism and regulating unit. A rate of flow controller usually consists of the following control elements :—

(a) A detecting element, which in general is a restriction in the flow pipe, such as an orifice or venturi tube. This sets up a differential pressure, which produces the impulse for measurement;

(b) A measuring section of the control mechanism, which produces movement for measurement, such as moving the instrument pointer, or the recorder pen. This part of the mechanism can also change an electric current in proportion to measured values of rate of flow;

(c) A control section of the mechanism, which produces magnified control movement, either mechanically, or electrically, or by the use of electronic tubes. This magnified impulse moves the final element, namely,

(d) A regulating unit, usually a flow control valve or butterfly damper in the pipeline. It reflects how the control cycle develops from the process through all instrument sections back to the supply side of the process.

The basic principle of any pneumatic controller is to vary output air pressure from the control mechanism, as required for accurate maintenance of the controlled variable, by movement of the control valve. The impulse from rate of flow produced by an orifice usually moves a flapper, placed opposite the mouth of an air nozzle. Compressed air at constant pressure is supplied *via* a restriction, and an air branch line leads to the diaphragm chamber of a control valve. By varying this air pressure in the branch line, the position of the control valve, and thus the rate of flow in the controlled supply pipe, will be varied, according to the mechanical impulse (*see* Figs.)

A closed nozzle mouth produces the maximum pressure in the air branch-line and diaphragm chamber of a control valve, *i.e.*, a full supply of pressure of compressed air to the mechanism.

A full open nozzle mouth produces nil pressure in the air branch-line and diaphragm valve. Any intermediate air pressure in the branch-line can be produced by varying the distance between flapper and nozzle mouth, thus producing throttling position of the control valve. In practice, instrument mechanisms of pneumatic controllers are more complicated, but they are always based on this principle.

### Hydraulic Operation

Hydraulically operated control units use a power cylinder for movement of globe or of butterfly valves. This method of rate of flow control applies an instrument having either a small pilot piston cylinder or an oil jet nozzle. Both designs divert a powerful oil jet either to one or the other side of a power cylinder, moving the piston and piston rod. Any intermediate position of the relay, *i.e.*, pilot piston or the mouth of the jet nozzle respectively, will move the power piston into an intermediate position. Linked to the piston rod is a large control valve or damper in the pipe line. The impulse is shown as a mechanical movement derived from the control mechanism, which latter reacts to changes of rate of flow, but in practice many modifications of this simplified layout are encountered to produce the mode of control required.

The control of flow rates is essentially gradual. The change of valve position can be proportional to the change of rate of flow. This is "proportional" control. Where load conditions fluctuate, higher modes of

control have to be applied, such as " reset " and " rate " control.

Automatic control of rate of flow is usually performed by using a movement derived from deviation of differential pressure. Measurement of rate of flow may be a comparatively simple procedure, but control of the rate is not always so easy. The result of flow measurement has to be transformed into control movement, and this in turn into movement of a control valve. The mechanism to permit this can become very complex.

It is essential for correct rate of flow control that control valves are used with proper flow characteristics. In practical applications the controlled system usually has no real demand-side storage capacity, and this lack of storage capacity necesitates instant correction of any deviation. To do this without overshooting presents the greatest difficulty in rate of flow control.

It is obvious, therefore, that the proportional as well as the floating mode must be used, and reset action is usually wanted. Where heavy changes of load, or of supply occur, reset-rate mode of control should be applied.

These higher modes of control introduce superimposed corrective valve movements to the simple proportional mode of control. The change of valve position with variation of rate of flow is not accurate enough, even though it is in strict proportion to the amount of rate of change. The speed and acceleration (second derivative) at which changes of rate of flow occur have to be taken into account by the mechanism, so it becomes more elaborate, but more accurate.

## Compressible Fluids

Automatic rate of flow control of compressible fluids, such as industrial gases, has two variables, namely, pressure and velocity. Rate of flow control can be achieved only where the nature of the process makes one of these variables constant. Rate of flow may thus become pressure control, when velocity of the gas remains constant.

The three common problems encountered in rate of flow control are these :—

(1) Working condition : Downstream pressure is constant. Problem : to control the volume irrespective of upstream pressure.

(2) Working conditions permit delivery of a desired volume, which is always related to downstream pressure.

(3) Working condition : Upstream pressure is constant. Problem : To control the rate of flow so that delivery should be constant, irrespective of downstream pressure.

Another main control problem often encountered in the chemical industry, petroleum plants, oil refineries, oil cracking plants, and in manufacture of chemicals in general is : (4) Ratio-flow control.

The problem here is to control flow in one pipeline related to the rate of flow in a second pipeline, thus maintaining automatically a desired ratio between the two.

Control of pumps and pump-motors in chemical processes is often performed with proportional reset-type controllers able to deal with varying load conditions. Where variations of load and supply occur frequently, however, and process characteristics in general are very unfavourable and only " stabilising " controller types will give satisfactory performance.

## Time Lag

The time lag between even a minute change of valve position and the corresponding adjustment of rate of flow is small, so the use of quick-reacting controllers having small instrument time lags and very carefully chosen valve characteristics is essential. Thus rate of flow control, more than in any other type of process control, calls for high-class control valves in order to avoid deviations from the desired value.

Automatic control of discharge of a reciprocating steam pump for providing constant rate of flow in a pipeline can be achieved as follows : An orifice is inserted in the delivery pipe from the pump, and thus measures the differential head. A steam control valve is fitted in the steam supply to the steam cylinder, and the automatic controller throttles the steam in accordance with rate of flow of the liquid, thus varying the speed of pump as required.

The control problem of using a centrifugal pump for discharge is somewhat easier, because this type adjusts itself automatically to rate of delivery, according to valve opening in the outflow from the pump. Fig. 1 illustrates diagrammatically the layout of this installation.

The problem of proportionating two rates of flow in two pipe-lines, and keeping them

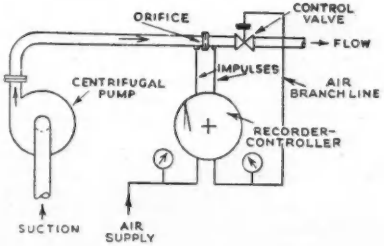



Fig. 1

automatically in a fixed ratio can be achieved by using two controllers, and by interlinking them so that the primary instrument readjusts the control mechanism of the secondary one, in accordance with the rate of flow in the primary pipeline. Alternatively, a so-called duel instrument can be used, as shown in Fig. 2. It incorporates two mechanisms in a single housing.

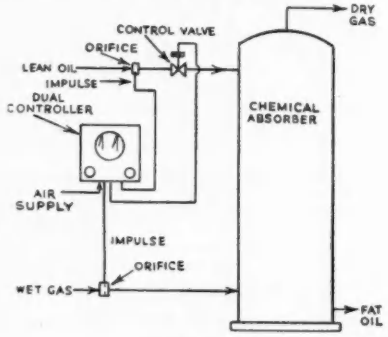



**Fig. 2**

The problem involved was to keep the inflow of liquid to a chemical absorption tower in strict ratio to the inflow of gas. Measurement of rates of flow is performed by orifices in the liquid supply pipe and in the gas inflow pipe. Both restrictions produce a differential pressure, which reacts on control mechanisms. The flow control valve, however, reacts on an air pressure, which is influenced by the ratio of these differential pressures.

It is often imperative that the flow ratio should be adjustable over a reasonably wide range, *e.g.*, when using ratio control in automatic combustion control systems, for maintaining the most suitable ratio between fuel and air for combustion. This ratio will, of course, vary with the quality of fuel used, and must be re-adjusted manually, should the fuel conditions vary.

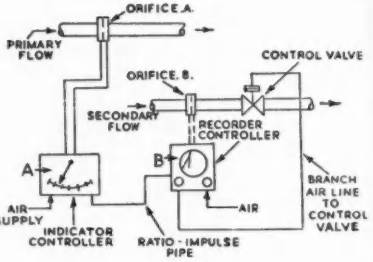



**Fig. 3**

The uncontrolled variable is usually called the "primary" and the controlled at the desired ratio is the "secondary." It is often sufficient for measurement purposes to use a non-indicating rate of flow controller for the primary flow, and to transmit its varying air pressure to the ratio-recorder-controller in the secondary flow. Fig. 3 shows the layout diagrammatically.

The set point of the rate of flow controller-recorder B is continuously controlled and varied, if necessary, according to flow in the pipeline, from the flow indicator A. This linkage by varying air pressure between the two instruments automatically maintains the desired rate of flow.

A constant rate of outflow by gravity from

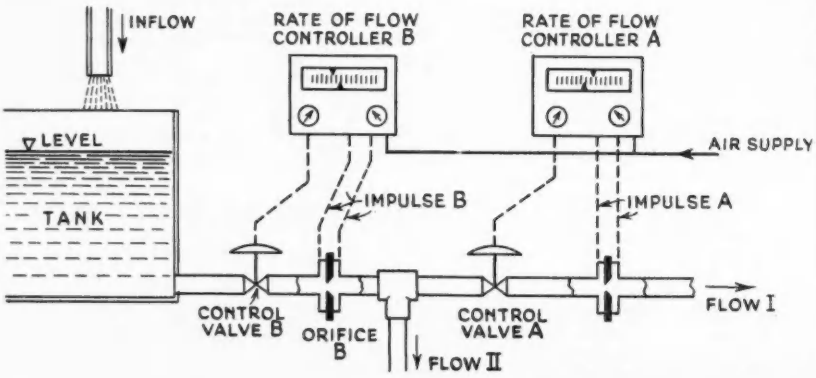



**Fig. 4**

a storage tank can be achieved by keeping the liquid level steady. An electrical mechanism (potentiometer) varies the rate of inflow by controlling speed of a pump motor, actuated by the movement of a ball float.

An interesting application of flow controllers is shown in Fig. 4, where rate of flow from a storage tank for liquid has to be split up into two streams of flow. The problem is to control the rate of flow in pipeline 1 by means of controller A, and outflow at 2 from controller B. Without reference to all the intricacies of control oscillations, it will be realised that A and B influence each other, and if it happens that the control cycle of A and B coincide, and have the same harmonic motion period, bunting might result; that, however, can be avoided by correct adjustments of both control mechanisms.

The same difficulties can occur, when pressure regulators and rate of flow controllers have to work together, and even more where "engineered" control of a chemical process sets in motion several controllers on the same plant.

Ratio flow control, as shown in Fig. 3, might under certain conditions also become somewhat difficult, unless sufficient means for adjustment of each controller are available to eliminate the influence of one controller disturbing the other.

### Area Meter-Controllers

The use of an area meter-controller of the Rotameter type for rate of flow control can be as follows: Position of the floating cone measures the rate of flow and an iron armature fitted on the rod of the measuring cone will alter an electric field in the transmitting coils. Any change in the inductance bridge of the circuit will cause flow of current through a balancing branch. This is amplified in an electronic amplifier and utilised to move the control valve motor, according to magnitude of unbalance, expressed in the cone position.

In chemical processing, problems of time-flow control might occur, requiring fluid flow to be varied according to a predetermined time schedule. This is also called "programme" or "time-cycle" control. Pneumatic recorder-controllers are mainly used for this purpose, having a cam attachment with a time clock for continuously resetting the control point.

Fig. 5 illustrates such a scheme, in which two programme controllers regulate, respectively, the inlet of fluid and draw-off of vapour material from the top of a chemical column.

A normal pressure recorder-controller A controls the outflow of vapours *via* control valve B. A time-cycle controller C, having a cam attachment, is applied to control the inflow into the column by means of diaphragm control valve D, actuated from a differential pressure set up in orifice E in the inlet pipe.

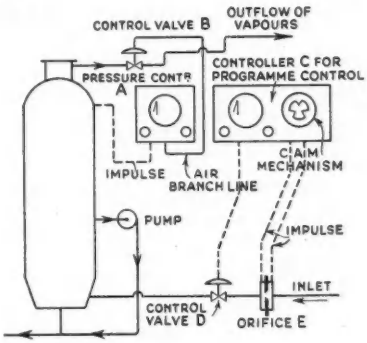



**Fig. 5**

The rate of inflow is thus varied at will, being determined by the shape of the cam, which can be cut by the user.

Throttling of steam flow to a turbine, driving a centrifugal pump, can be similarly performed. A gas engine may also be controlled similarly, the usual control method being a diaphragm motor altering automatically the setting of the control point of the engine governor, the control motor deriving its impulse from an orifice in the outflow from the pump being operated (Fig. 6).

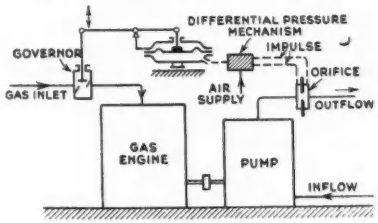



**Fig. 6**

Although rarely done, it is possible to couple two volumetric meters for providing flow-ratio control. The fluids to be proportioned are pumped through volumetric meters. A differential gear actuates a control valve, whenever the preset flow ratio deviates from the desired ratio.

The number of flow control problems encountered in the chemical industry is very great, and only a few examples have been touched on here.

# Bleaching of Edible Oils and Fats

## Recent French Work with Sodium Chlorite

SODIUM chlorite was first made in France by the Société d'Electro-Chemie d'Ugine, and is now evoking much interest as a bleaching agent for oils and fats. M. J. Mouton (Director of the Bleaching Institute) and R. Borezée (of the d'Ugine research staff), in an article in *Oléagineux*, 1949, *4* (5), 271-280, after a brief description of its chemical nature and properties, review in some detail its various applications as a bleaching agent for oleaginous products. This is based on a considerable amount of research in association with the Lab. Nat. des Corps Gras de Marseille and in the research laboratories of Société d'Ugine.

Sodium chlorite has a special action on the colouring matter of oils and fats, especially in conjunction with the addition agents, with which it functions readily, irrespective of whether they are reducing, oxidising, catalytic or other. Necessary conditions for effective action are: choice of additive, concentration, temperature, *p*H, and time. There are no injurious reaction products, and the bleaching is generally accompanied by a marked de-odourising effect.

### German and U.S. Work

Much work has already been done in Germany and especially in the U.S.A., and forms the subject of a voluminous literature and many patents in which those of the Mathieson Alkali Works figure prominently. The French investigators have studied the following methods of use: (1) chlorite alone, (2) chlorite activated with acids or acid salts, (3) activation with persalts, (4) activation with hypochlorites, (5) direct action of chlorine dioxide, and (6) in the presence of various products, such as reducing agents.

Used alone in aqueous solution (*e.g.*, 20 per cent) and stirred with a fatty oil, the chlorite appears to be decomposed by reaction with the free fatty acids accompanied by varying degrees of bleaching. The amount of chlorite used varies from 0.1-1 per cent by weight of oil. Many seed or nut oils and some animal fats of low acidity may be treated in this way, although it is not adequate for highly acid or dark-coloured oils.

Activation with acids, the subject of many American patents, has proved of some interest, the acids used being mostly sulphuric or hydrochloric in strengths of 0.1-1 per cent of weight of oil treated. The rate of decoloration is largely a function of temperature, and in some cases the process requires no more than an hour. Washing with water follows and, if necessary, neutralising of any acid remaining.

French workers have investigated many other acids, both organic and inorganic, and have found phosphoric acid of particular interest. It gave, indeed, the best results. This seems due to the action of certain acid or partly saturated phosphoric derivatives, and to coagulating and mucilage-precipitating effects.

### Colourless Complexes

It is known that certain phosphates with metallic ions produce absolutely colourless complexes. Moreover, the use of partly saturated acids (pyro- or other phosphates) permits the addition of activating agents under easy control. Other advantages are the elimination of corrosion, the well known property of phosphates, and the virtual absence of risk of recoloration.

Although use of chlorite activated by acid has much to recommend it, there is the objection that its *p*H range of activity must not exceed about 7. It is sometimes desirable to work in an alkaline medium and therefore with *p*H above 7, as in certain bleaching operations connected with soap manufacture.

The addition of persulphates—or other persalts—in this connection has been studied. Sodium persulphite, for example, reacts with the chlorite to form chlorine dioxide and sodium sulphate, and the formation of the dioxide being less vigorous than with strong acids, a more general use in bleaching is practicable. Potassium or ammonium persulphate may also be employed, and the method is similar to that employing acid. It is very useful for tallows and other animal oils or fats, as well as soaps.

### Peroxide

The use of chlorite plus hypochlorite induces reactions which may be more readily controlled, *e.g.*, to form chlorine dioxide (peroxide) or conversely the chlorate, so that *p*H may be either above or below 8. Here, of course, light may play an important part. These reactions are exemplified in some American patents, such as those of the Mathieson Alkali Works, with maize oil bleaching, in which temperature is given as 95-100° (presumably F.) and *p*H = 7.

The fifth example, using dry chlorine dioxide, also figures in the Mathieson processes; but as the gas is dangerous it must be largely diluted with air or other inert gas. A special apparatus for this purpose

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# Technical Publications

NEW facts about iodine are constantly being discovered and formulated and the Iodine Educational Bureau plays a valuable part in keeping the chemist and industrial technologist informed of the latest scientific developments. Three of the most recent issues of "Iodine Information" are concerned with applications of iodine in chemical analyses (No. 21), mastititis (No. 22), and chemical detection of iodine (No. 24). They are produced in an attractive and serviceable format. The bureau, which is maintained by the Chilean nitrate and iodine producers who supply the greater part of the world's iodine requirements, also produces a number of publications ranging from studies for use in schools to more technical issues for use in science and industry.

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The necessity to have a criterion of purity is recognised by all research chemists, and the appearance of a fourth revised and enlarged edition of "AnalaR Standards for Laboratory Chemicals" formulated and issued jointly by the British Drug Houses, Ltd., and Hopkins & Williams, Ltd., is therefore welcome. Specifications for 58 new AnalaR chemicals are included. Anhydrous ferric chloride has been omitted owing to the difficulty of preparing a satisfactory product due to its instability. Improvements included are: specific solubility tests in almost every monograph; adoption of the technique of electrolytic deposition for the assay of certain metallic salts and removal of the principal metal from such salts; the Karl Fischer method for determination of water is adopted for all organic liquids amenable to this technique, except acetone.

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A plumbing system in a prefabricated unit form which can be quickly installed to supply the needs of almost any laboratory layout should be of interest to those proposing to install a new laboratory, or to extend existing facilities, and particularly to users abroad where skilled plumbing operatives are not readily available. The Gallenkamp unit plumbing system is comprised of 3-ft. units with as many pipes and fittings as required. The units can be placed adjacently and connected, or interspersed with pipes of convenient length. Generally, chemical lead waste pipes are installed, but other special resistant materials can be met. Prices quoted in the brochure now issued, are for components installed into a complete 3 ft.-wide unit.

A very clear description of all the fundamental principles of vegetable oil refining and hardening is offered by the latest publication of the Power Gas Corporation, Ltd. "P-G Oil Refining and Hardening Plant" usefully illustrates the various phases involved with pictures of appropriate items of processing plant which they have produced for the purpose.

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In the reign of George III a young man named John Evans started a wholesale druggists in Worcester. That was the genesis of the present world-wide organisation of Evans Medical Supplies, Ltd. In "140 Years of Service," a brochure just issued, the story of the company is told and the work of the sterile products and organic compounds units, the biological institute, pharmaceutical laboratories and drug mills, and the fine chemicals works, is effectively presented by a number of well-chosen photographs.

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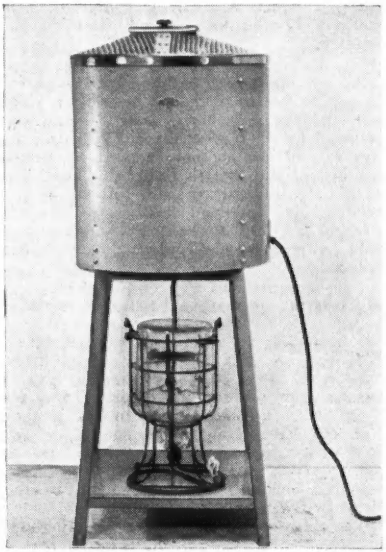

[*Courtesy, Runbaken Electrical Products*

**New type of water distillation plant, the Autostil, which can be used wherever there is an electrical supply. If water is not replenished the machine automatically switches off**

The Yearbook of the British Standards Institution, which has just been published, gives a subject index and a synopsis of each of the current 1500 British Standards prepared by representative committees of 55 different industries.

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The 42nd edition in the U.S.A. of Metal Statistics (1949) contains in its 800 pages a rich assortment of statistical information on ferrous and non-ferrous metals and miscellaneous economic subjects, gathered from reliable sources not confined to America. There are many new tables, and a buyers' directory of 150 pages. The book, edited by N. J. Langer, is published by the American Metal Market Co., 18 Cliff Street, New York, 7. Price $2.

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Improvement in the availability—at present still restricted—of silicone rubber materials for industry is foreshadowed by new processing facilities lately put into operation at Sidcup, Kent. After two years' experimental work on extrusion and moulding, Richard Klinger, Ltd., is now producing on a commercial scale sheets, mouldings and extrusions employing the Silastic 160, 161 and 181 which Albright and Wilson, Ltd., markets in the unprocessed state in this country.

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A new analytical balance with a radical change of design in that it has only a single pan balance has been designed and constructed by J. W. Towers & Co., Ltd., and was one of the company's most interesting exhibits at the British Industries Fair. This design eliminates errors due to beam length, reading, and corroded or worn weights. All weights from 0.1 to 199.9 gm. are operated from outside by manipulation of four control knobs.

# Automatic Magnesium Casting

## U.S. Report on German Method

MAGNESIUM castings of 2 and 3 lb. were produced in Germany during the war on a novel, fully-automatic machine. This is now recalled in an Office of Technical Services report just released in the U.S.A. by the Department of Commerce.

The Mahle die casting machine, a sample of which was inspected at the U.S. Army's Frankford Arsenal in Philadelphia in co-operation with the American Die Casting Institute, is described as a novel "hot chamber injection" design. Although not the most improved model, sufficient was learned to recommend certain desirable features for further consideration in U.S. practice.

Some observers believed that if a fully automatic die-casting machine with a device to protect the operator from molten magnesium could be designed using principles of the Mahle machine, a more uniformly high quality output might be achieved than was now possible. Particularly worthwhile would be the use of high hydraulic pressure for all operating and locking pressures of the press, as well as for operating and locking the cores, and for ejection of the castings.

The report further suggested that the construction of dies utilising fabricated base plates and cylindrical "screw-in" lugs was an economical measure which might find application in the construction of dies for plastic moulding.

■ ("*Mahle Die-Casting Machine and Dies*," No. PB-97113, including photographs. $1.50 from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.)

## BLEACHING OF EDIBLE OILS AND FATS

(*Continued from page* 930)

has been described in the American patent. (Cf. chlorine dioxide patents, THE CHEMICAL AGE, *60*, 862.) Chlorine gas is passed over the sodium chlorite, dry, and there is no aqueous phase in the method. But the French authors refer to the delicacy of the process and risk of oxidation or peroxidation, with formation of highly coloured products and they suggest further study with inert gas dilution.

The sixth variation, activation with reducing agents, involves the unusual concept of activating an oxidant with a reducer. It is certainly not simple to represent the theoretical equations taking part here. In a simple case, that of an aldehyde such as $CH_2O$, the equation may be: $7NaClO_2 + 4CH_2O = 4ClO_2 + 3NaCl + 4NaCHO_2 + 2H_2O$.

Oxidation thus appears to take place in two stages owing to the intermediate formation of formic acid, which in turn serves as activator of the chlorite, with other acids. The two stages are: (a) formation of formic acid and sodium chloride, (b) formation of chlorine dioxide, sodium chloride and formate, and water. A better deodourising effect is achieved in this way.

Interesting results were also obtained with other reducing agents such as hyposulphates, and it is intended to pursue this theme.

Reference is also made, in concluding this section, to air-blowing of oils, the passing through of a current of air at a fixed temperature for a prolonged period. It has been found that the addition of a very small amount of sodium chlorite considerably accelerates the bleaching process with air at a lower temperature.

# A CHEMIST'S BOOKSHELF

**Glycerin, Its Industrial and Commercial Applications.** Leffingwell and Lesser. 1949. London: Crosby Lockwood and Son, Ltd. Pp. 259. 15s.

This book might be described as the Chemical Formulary of glycerine. It contains no details concerning the preparation, recovery or properties of glycerine except in the introductory chapter which covers the history of the substance, but there are 26 chapters each dealing with its use in a particular industry or product. Examples given include polishes, explosives, textiles and cosmetics. Each chapter contains selected formulations and in many cases a reference to the original literature is also quoted. Concluding the book is a chapter on glycerine derivatives and a list of 1583 uses. Among the derivatives are listed the uses and specifications of certain glyceryl esters, *e.g.*, glyceryl monolaurate, chlorhydrins and several ethers, *e.g.*, glyceryl monomethyl ether, together with glycerine formal and furfural. Some physical properties of glycerine are listed in an appendix and these include the specific gravity, relative humidity, and freezing point of aqueous solutions and the vapour pressure of pure glycerol. This book contains a wealth of information on the compounding of different glycerine preparations.

**Analyse Der Metalle** (Analysis of Metals). Dr. Ing. O. Proske and Prof. Dr. H. Blumenthal. First volume: Principles of Arbitration. Second edition, 1949. Berlin: Springer Verlag. Pp. 508. Rm.32.

This book is the first in a series of manuals, edited by the Chemical Division of the Society of German Metallurgists and Miners, the two companion volumes to follow being concerned with works methods of analysis and with sampling and assaying. The present volume represents the joint work of 60 contributors, all experts in analytical methods. Some 20 metals and their analysis, which are described at length, can therefore be considered as standard methods for analytical arbitration. The elements are dealt with in alphabetical order by chapters, describing not only the principles of analysis, but also their application for raw materials and finished products. There are numerous references to the literature on each subject, 25 well chosen illustrations and a comprehensive index of names and subjects. The work is altogether a useful reference book, full of practical information collected on extensive authoritative experience, much of it presented in convenient tabular form. It will serve as an arbitration guide for trade and industry, and should be specially welcome when the London Metal Exchange re-opens. Reliable analysis can often serve as a guide to arbitration and fair dealing in commercial matters and the methods and principles of this book can be considered as a useful aid to that end.

**Grundlagen Der Eisengewinnung** (Fundamentals of Iron Production). (Dr. Ing. Robert Durrer. Verlag Francke A.G., Bern. V. V + 210 pages. S.Fr. 20.

This book is written for students as a guide in the wide field of iron extraction by smelting and other processes. After the Iron Age, the furnace method remained dominant until a new phase was entered with the use of coke instead of charcoal and coal and of oxygen instead of hot blast. The author covers the whole field of iron and steel science and practice in a brief but comprehensive form unencumbered by references. The more practical section of the work describes the various processes of direct reduction, beginning with the blast furnace, followed by the electric furnace process and by the methods for refining iron into wrought iron and steel. There are 85 figures and a series of important tables. The Iron and Steel Institute, London, wrote of this work: "Dr. Durrer has produced a most informative little book, which, despite the wide field covered, is easy to read; there appears to be no comparable work in the English language at present."

## Standardised Plumbing

A new plumbing code to promote standardisation has been published by the American Society of Mechanical Engineers, 29 West 39th Street, New York 18, as ASA-A40.7-1949. The 87-pages document ($2.50) covers minimum safety and health requirements for design, installation inspection, and performance of plumbing systems.

# Personal

A BELGIAN State award—the Francqui Prize—for distinguished work in the study of physics has been awarded to PROF. LEON ROSENFELD, professor of theoretical physics at Manchester University. Since he took up his appointment at Manchester, in 1947, Prof. Rosenfeld has been particularly concerned with research into the structure of atomic nuclei. This award is made annually and is restricted to Belgian scientists. It is made in rotation, one year for work in the exact sciences—mathematics, physics, or chemistry—another year for work on biology or medicine, and a third year for the study of the social sciences, such as philology or history.

The following officers have been announced by the Association of British Insecticide Manufacturers for the 1949 session :—Chairman, DR. J. R. BOOER (F. W. Berk & Co., Ltd.); vice-chairman, DR. E. HOLMES (Plant Protection, Ltd.); hon. treasurer, N. K. SMITH (Murphy Chemical Co., Ltd.); hon. auditor: A. G. PONTON (Pan Britannica Industries, Ltd.). Executive committee: E. T. BUGGE (Bugges Insecticides, Ltd.), A. T. DAVEY (Burt, Boulton & Haywood, Ltd.), J. S. MITCHELL (Murphy Chemical Co., Ltd.), J. E. R. SIMONS (George Monro, Ltd.), N. K. SMITH (Murphy Chemical Co., Ltd.), F. W. SUGDEN (Plant Protection, Ltd.), and H. J. JONES, *ex officio* (Hemingway & Co., Ltd.).

MR. J. D. ROSE, of the research department, Manchester, of I.C.I., Ltd., has been elected one of the two members for the north-western constituency of the Chemical Society Council. The council has in the past largely been chosen from academic circles, and the election of a member of an industrial organisation is thought to indicate recognition of the present very intimate ties between industrial and academic research.

MR. G. LEGH-JONES, managing director of Shell Petroleum Co., Ltd., is to address the general committee of the Parliamentary and Scientific Committee, on Tuesday next, June 28, at 5 p.m., in committee room No. 12, House of Commons, on the subject of Britain's £125 million oil refinery programme and its technical and economic significance.

DR. C. F. FLINT, assistant manager of the rubber service department of I.C.I., Ltd., Manchester, has been appointed head of the National College of Rubber Technology. He joined Hexagon House, Blackley, Manchester, in January, 1934, as head of the latex section. During the war, he was a member of the Inter-Services Rubber Investigation Panel.

MAJOR F. MONK, manager of the employment and welfare department at Fort Dunlop, is joining Dunlop's central personnel department as chief safety officer to co-ordinate accident prevention work throughout the company's organisation.

The council of the Textile Institute has elected MR. ALLAN DRAPER, F.T.I., of Swinton, Lancs., as its chairman for the ensuing twelve months, in succession to MR. H. G. GREG, of Stockport, who has resigned after holding office for the past five years. Mr. Draper is director and manager of Richard Haworth & Co., Ltd., Salford.

PROF. R. SIGNER, Ph.D., head of the Institute for General and Special Organic Chemistry at Berne University, has been awarded the Lavoisier Medal of the French Chemical Society.

# Obituary

MR. JAMES ANDREWS MACARTHUR, Newlands, Glasgow, a leading authority on whale oil, died suddenly on June 17 while on holiday in London. Born in Glasgow, he was associated with the oil-refining firm of W. B. Dick & Co., Ltd., Crownpoint Road, Glasgow, for 60 years, and retired in 1945 when he was a director and manager. He was a past chairman of the Oil Trades' Association.

The death has occurred of DR. HERBERT WILLIAM BOLAM, B.Sc., Ph.D., F.R.I.C., Drumchapel, Glasgow, who was lecturer in chemistry at the Queen Margaret College, Glasgow, from 1903 to 1934. He was lecturer-examiner in chemistry at Glasgow University for degrees in Arts, Science, and Medicine from 1915, and a lecturer-member of the Senate of the University from 1923 until his retirement.

The death was reported last week of MR. ROBERT ERNEST GALE, manager of the high-frequency and instrument sections of the Tooting works of Philips Electrical, Ltd. Mr. Gale, who was 47, joined the firm 20 years ago. He had been ill for some time.

MR. CHARLES DAY, M.Sc., vice-chairman of Mirrlees, Watson & Co., Ltd., died in Manchester last week, aged 81. He was a former president of the Institution of Mechanical Engineers and of other engineering bodies.

**Change of Address.**—The head office of the Woodall-Duckham Vertical Retort & Oven Construction Co. (1920), Ltd., has been transferred to 63-77 Brompton Road, S.W.3.

# Home News Items

**Less Demand for Coated Paper.**—More than 60 workers have been paid off and 300 others placed on short time at the Clyde Paper Mills, Rutherglen, Scotland, the reason being given as the reduced demand for coated paper, in expectation of a reduction in the price after July.

**Textile Technology Scholarships.**—About 50 applications have been received by the Textile Institute for two scholarships currently offered to enable students of textile technology to take three-year degree courses in the subject at a university. One, value £1000, provided from the Institute's development fund, is open to students who have not yet entered the textile industry as well as to young people in the industry. The other, value £750, is open to young craftsmen in the cotton industry.

**Rust-Proofing Cars.**—The new use in relation to cars of modern rust-proofing technique was demonstrated at the Cowley works of Morris Motors recently. The Rotodip plant, designed and built by the Carrier Engineering Company, is the first to be installed in a motor factory. The bodies of the vehicles pass through a metal tunnel divided into a number of tanks and are rust proofed inside and out by the Pyrene "bonderising" technique. The process takes 1¾ hours.

**Paper Sacks for Chemicals.**—Among the exhibits at the Medway Industries Exhibitions, held at Rochester, Kent, was a display, by William Palfrey, Ltd., London, of their "Palfsacks" multi-ply paper sacks, suitable for containing a variety of chemicals, cement, foodstuffs, pulverised or powdered compounds, and even metal articles. There was a demonstration of the construction of these sacks in one to six piles, also the use of waterproof and wet-strength plies.

**"Morale Cannot be Nationalised."**—Declaring that the morale of private enterprise cannot be nationalised, Mr. A. K. McCosh, chairman, speaking at the recent annual general meeting of Bairds and Scottish Steel, Ltd., in Glasgow, said: "Men cannot be handled as pawns on a chessboard. To give of their best they must be treated as human beings. That this is not the case in nationalised industry is well exemplified by the publicly expressed complaints of the dilatory, impersonal, and unfeeling treatment by the National Coal Board of members of the staffs of the former colliery companies who were taken over on the vesting date."

**Coal Output.**—Production of deep-mined coal in Britain last week returned to over four million tons, following the previous week's decrease due to the Whitsun holidays. Comparative figures were:—Last week: 4,237,400 tons (deep-mined 4,054,100 tons, opencast 283,300 tons). Week ended June 19, 1948. 4,188,400 tons (deep-mined 3,915,900 tons, opencast 272,500 tons).

**Oil from Secondary Shale.**—Edinburgh reports indicate that work is being started on the processing of "waste" shale, stored in immense tips throughout the Scottish oil shale area. Earlier policy encouraged the processing of top grade shale and the disposal of secondary types. Improved processing methods and the need to achieve maximum throughput of expanded facilities has made the discard suitable for recovery.

**Miners Support Distillation Plan.**—Approval of the miners for the Lanarkshire coal distillation project was given at the recent Scottish Area National Union of Mineworkers' conference in Ayr. The conference called on the Government to consider immediately the establishment of such a plant in the area, on the lines already proposed. It is known that mining experts are not enthusiastic and that the NCB would rather see the men in the area transferred to more productive work elsewhere.

**Long Service Awards.**—Six employees of Samuel Heap & Sons, Ltd., dyers and finishers, Caldershaw Mills, Rochdale, with 315 years' service between them, recently received the congratulations of the chairman, Mr. S. Heap, and cheques as an appreciation of long and faithful service with the company. The men were Solomon Holt, (59 years 9 months), William Cooper (52 years 9 months), Leonard Howard (51 years), Matthew Sheridan (50 years 11 months), William Hume (50 years 7 months) and Wilfred Roberts (50 years 3 months).

**A Modern Road System.**—The total cost of the plan of the British Road Federation to give Britain a modern road system is £600 million. Spread over a period of 10 years, which is suggested, this represents a yearly cost of £60 million, but it is believed that the scheme would pay for itself in 10 years and that thereafter there would be a yearly saving of this £60 million figure by the economies effected by the construction of the projected improvements. The savings would be on such items as petrol, by a reduction in unnecessary stops, tyres, less wear and tear on vehicles, time, and accidents.

# Metal Removal

## Improved Oxidation Method in U.S.A.

METHODS and apparatus for the removal thermochemically of metal from metal bodies or alloys of the type which resist, or are substantially immune to, progressive oxidation by conventional thermochemical metal-removing procedure are the subject of a patent* just made available for licensing or sale by the Linde Air Products Company, New York. The metal is removed by steadily advancing a preheating flame and an oxygen jet progressively and concurrently against successive areas of the immune body. At the same time a stream of finely divided combustible adjuvant material is introduced into the zone of action so as to oxidise constituents of the metal body and form reaction products sufficiently fluid to be expelled by the oxygen jet. The adjuvant material may be introduced by any suitable means, either inside a blowpipe nozzle, or just outside as the jet emerges. Varying methods, numerous kinds of adjuvant materials, and modified forms of blowpipe nozzles are described for different operations such as cutting, de-seaming, de-surfacing, etc.

**U.S. Patent No. 2,451,422 Thermochemical Removal of Metal with a Flux-Forming Powder in the Oxygen Cutting Stream.*

# ELECTRICALLY HEATED GLASS

OF interest to laboratory instrument makers are the new electrically conductive coatings for glass, the development of which was reported at an American Chemical Society symposium, recently, by Dr. Robert H. Dalton, chemist of the Corning Glass Works, Corning, New York. The coatings are thin and transparent, but are claimed to be extremely tough and tenacious and capable of being varied to produce any desired electrical resistance from 10 to 10,000 ohms.

An electrical current passing through such a coating generates heat as does any conventional electrical heating element. Suggested applications are for radiant heaters, heat interchangers and defrosters.

**New Ophthalmic Glass.**—Chance Bros., Ltd., Smethwick, Birmingham, announces the production of a new opthalmic glass, "Crookes" Alpha. This is to replace its "Crookes" A.1 type, which has been banned for commercial purposes by the Government, owing to the strategic value of uranium, a small proportion of which was used in its composition.

# Next Week's Events

MONDAY, JUNE 27

**Electrodepositors' Technical Society.** London. Visit to Ford Motor Co., Ltd., Dagenham, Essex. Leave Charing Cross pier 11.30 a.m.

**Nottingham Trade Exhibitions** (until July 2).

TUESDAY, JUNE 28

**Parliamentary & Scientific Committee.** London. House of Commons, 5 p.m. Meeting of general committee to receive reports of sub-committees on fuel utilisation; technical education; and development of backward areas under President Truman's "Fourth Point." To consider visits to research stations, and report final arrangements for reception to delegates of the Fourth Empire Mining and Metallurgical Congress. Address and discussion on Britain's oil refinery programme.

THURSDAY, JUNE 30

**The Royal Society.** London: Burlington House, Piccadilly, W.1. 4.30 p.m. The Croonian Lecture for 1949 will be delivered by Dr. D. W. Bronk, foreign secretary of the National Academy of Sciences and chairman of the National Research Council, U.S.A.

# ELECTRON MICROSCOPY

By the courtesy of Prof. Sir Lawrence Bragg, a summer school in electron microscopy will be held again this year in the Cavendish Laboratory, August 16-27. The school will provide a grounding in the theory and applications of the electron microscope. It is intended for those who are already, or in the near future will be, operating it in physical, chemical or biological laboratories.

The lectures will deal with the fundamental theory and operating principles of the electron microscope. The various techniques of specimen preparation will be demonstrated, and practised in small groups by the class. The three leading models of instrument will be used, and discussions held on their special characteristics.

Visitors should communicate with Mr. G. F. Hickson, secretary of the Board of Extra-Mural Studies, Stuart House, Cambridge.

**Dye Works Fire.**—Damage to the value of over £40,000 was caused by a fire at the Kid Clough Dye Works at Middleton, Lancs, belonging to Jopson, Ashworth & Edmunds, Ltd. There are 100 workers affected, but employment has been found for these in another section.

# Overseas News Items

**Reclaiming French Iron Ore.**—Vast reserves of "unusable" iron ore in Lorraine are expected to be made available for production by the adoption of a new process invented in the U.S.A.

**Agricultural Research.**—Work has started of an $860,000 research laboratory for the science service of the Dominion Department of Agriculture at the University of Western Ontario.

**Fuller's Earth: U.S. Record.**—Production of Fuller's earth in the U.S.A. in 1948 reached a total of 342,081 short tons, valued at $5,27,851. This was four per cent better than the previous year and showed a two per cent increase over the previous record of 355,644 short tons established in 1930.

**Profitable French Phosphate Mining.**—The Compagnie des Phosphates et du Chemin de Fer de Gafsa, which is most active in the exploitation of the phosphate of Tunisia, showed a net profit of 29 million francs for last year, which has been added to reserves. In 1947 a loss of 37 million francs was reported.

**Monsanto's Subsidiary.**—The Monsanto Chemical Company announced last week that it had become owners of all the shares of Merritt-Monsanto Corporation, Lockport, New York, manufacturers of veneer and plywood equipment. Mr. John E. Gurvin, vice-president and general manager of Monsanto, succeeds Mr. Ericsson H. Merritt as president of the subsidiary.

**Tanning Extract.**—The exploitation of the jujube tree, a fast-growing spiny shrub, which has become a pest in parts of Northern Queensland, is receiving the attention of Australian research chemists. The bark is said to yield excellent tanning extract for leather which might usefully supplement the wattle bark imports from South Africa. The tree occurs fairly abundantly in the Mediterranean areas also.

**Chemical Oil Additive.**—A new all-chemical additive to improve the operating characteristics of motor oils, has just been announced by the Petroleum Chemicals Department of the American Cyanamid Company, New York. The new product, Aerolube 70, has been made available to refiners and blenders of motor oils, and is said to be an exceptional oxidation and bearing corrosion inhibitor. In addition, it may offer transport economies to the oil refiner, because it is easily handled in its pure state and therefore requires no dilution with carrier oil.

**Nuclear Research Equipment in Sweden.**—The laboratory lately added to the Chalmer Technology Institute at Gothenburg is to be equipped with a 4-million volt generator, to be used in research on nuclear fission.

**Chemical Works for Algeria.**—A 10-year plan for the industrial development of Algeria envisages the erection of 13 chemical works, the manufacturers of which will include dyes, insecticides, varnishes, glue and gelatine.

**Czechoslovakian Kaolin.**—On the basis of the Czechoslovak-German trade treaty, an agreement has been signed under which Czechoslovak kaolin will be supplied to Bavarian porcelain factories. It is reported that over 18,000 tons are to be sent in the next half-year.

**Home Produced Fertilisers.**—The Colombian Caja Agraria has established at Palmira (Department of Valle del Cauca) a factory with an estimated daily output of 80 tons of various types of fertilisers. Further plants are to be set up at Buga in the same Department, and on the Atlantic Coast.

**W. European Iron and Steel.**—The Economic Co-operation Administration has recommended, in a survey of the iron and steel commodity programme, that Marshall Plan countries should be cautious about expansion of iron and steel production facilities, otherwise Western Europe may have an exportable surplus—with no markets available—by 1953.

**U.S. Aluminium Output.**—Production of primary aluminium in the U.S.A. in March totalled 54,852 short tons, about 10 per cent more than the previous month, while output for the first three months of this year reached 157,957 short tons, about 8 per cent greater than the first quarter of 1948. Month-end stocks at reduction plants at March 31 were 11,786 short tons, 22 per cent lower than at the end of February.

**India's Synthetic Fuel Plans.**—Durgapur, in West Bengal, about 150 miles from Calcutta, has been selected as the site for India's synthetic petrol plant, to be set up at an estimated cost of about Rs70 crores. The scheme envisages that the plant, which is expected to be completed within two years, will produce nearly 67,000 tons of aviation petrol yearly, besides other grades of petrol and lubricating oil. It has been stated that an American company is likely to be given the contract for the construction of the plant and that supervisory work will be carried out by a German firm.

# Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

## Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

WILLIAM COOK & SONS (SHEFFIELD), LTD. (M., 25/6/49.) May 20, £1350 mortgage, to Woolwich Equitable Building Society; charged on 9 Norton Lees Crescent, Sheffield. *£3950. July 5, 1948.

PEST CONTROL, LTD. (formerly PEST CONTROL HOLDINGS, LTD.), Bourne (Cambs.). (M., 25/6/49.) April 23, two debentures (supplemental to a debenture dated January 28 and registered February 9, 1949) securing to Hambros Bank, Ltd., money now or at any time owing to the bank as testators for Erlangers, Ltd., and M. Samuel & Co., Ltd., respectively by the company or Pest Control (United Kingdom), Ltd., or any subsidiary of either of them; charged on property, etc.

HIGH DUTY ALLOYS, LTD., Slough. (M., 25/6/49.) May 18, charge, for securing an issue of £3 million first debenture stock of Hawker Siddeley Group, Ltd., and a premium of 1 per cent secured by a trust deed dated May 17, 1949 (subject to certain provisos). General charge. *Nil. Jan. 28, 1949.

## Satisfactions

GITTINGS & HILLS, LTD. (formerly GITTINGS, HILLS & BOOTHBY), Birmingham. (M.S., 25/6/49.) Satisfactions May 21, of amount outstanding July 1, 1908, and debenture registered February 22, 1926.

WAYMOUTH GAUGES & INSTRUMENTS, LTD., Godalming. (M.S., 25/6/49. Satisfaction May 20, of debenture registered September 13, 1946, to the extent of £11,500. (The debt for which the charge was given having been partly paid with the proceeds resulting from the sale of part of the property, or undertaking charged).

# Company News

The following increases in registered capital are announced: **Allied Colloids (Bradford), Ltd.**, from £7000 to £20,000; **Tennants Textile Colours, Ltd.**, from £100 to £50,000.

The **Bleachers' Association,** the Manchester combine of cotton bleachers and finishers, etc., in its preliminary report for the past year announces a 50 per cent increase in net profit from £188,023 to £297,763. Dividends on the 10s. ordinary stock is raised from 3 per cent to 5 per cent.

**Boots Pure Drug Co., Ltd.**—Aggregate net profits of the company and its subsidiaries for the year ended March 31, amounted to £1,070434 (£948,401) after providing £1,227,500 (£1,084,000) for taxation. Net profit of the parent company amounted to £627,662 (£679,428) after providing £612,500 (£562,650) for taxation. A sum of £100,000 has to be deducted from reserve for fall in value of stock in trade, part of the loss incurred through the 1948 reductions in purchase tax. A final ordinary dividend of 20 per cent (same) will be paid in September, making a total of 40 per cent (same).

The name of **Chemresco, Ltd.,** was incorrectly published as Chemrison, Ltd. (THE CHEMICAL AGE, *60*, 805).

# New Companies Registered

**B.B. Products (Drysalters), Ltd.** (469,413). Private company. Capital £5000. Objects: To acquire the business of manufacturers of chemical productions and preparations, carried on as B.B. Products. Directors: J. W. Smith, R. S. Blackledge. Reg. office: 18 Mitchell Street, Sheffield.

**John Drury & Co., Ltd.** (469,677). Private company. Capital £20,000. Objects: to acquire the business of a soap and glycerine manufacturer, now carried on as "J. Drury & Co." Directors: F. Drury and Mrs. B. A. Drury. Reg. office: 28 River Street, Brighouse, Yorks.

**R. & J. Garroway (1949), Ltd.** (27,101). Private company. Capital £50,000. Manufacturers, merchants of chemicals, fertilisers, etc. Directors: G. T. Macleod, J. H. C. Macleod, F. C. Macleod, J. M. Macleod, T. W. Pagan. Reg. office: 694 Duke Street, Glasgow, E.1.

# Chemical and Allied Stocks and Shares

STOCK markets failed to benefit from the better turn in international politics and the tone remained very cautious, particularly in view of a sharp reaction in British Funds earlier in the week. The fall in gilt-edged securities affected markets generally, although movements this week in industrial shares were relatively small. Indus-

trials have fallen heavily this month, and the view has been held in many quarters that British Funds were relatively overvalued in comparison with front rank industrial investments, more particularly high class preference shares and debentures.

An important factor in the situation has been the widespread report that the Imperial Tobacco Company is planning a new issue of £20 million in 4 per cent preference shares at par, because a first class issue yielding a clear 4 per cent would make many other investments look dear by comparison. In view of the possibility of competition of this kind, investors have been holding off markets, with the result that there has been a general marking down of industrial preference shares and debentures.

The fall in British Funds is also partly explained by this, although there have been other factors, such as the absence of official support for British Gas stock, which the market had assumed would not be allowed to fall below par until the further large amounts had been issued as compensation to remaining shareholders in gas companies.

Industrial shares are fairly steady at the time of writing, although small declines have predominated, and the chemical and allied sections have reflected the general trend. Imperial Chemical at 44s. 3d. have been easier. British Oxygen eased to 92s. 9d., awaiting the new issue terms. British Glues & Chemicals 4s. shares have come back to 18s. Monsanto were steady at 51s. 3d., but Turner & Newall, after a rally, seceded to 71s. 6d., and United Molasses were easier at 37s. 3d. on the fear that profits may be affected by the lower price of molasses in the U.S.A.

General Refractories at 23s. 9d. have kept relatively steady, as have British Aluminium at 45s., but Glaxo, despite continued talk of bonus prospects, receded to £18 after an earlier rally. William Blythe 3s. shares were firm at 22s. 6d. on the bonus. Coalite & Chemical shares dropped back from 2s. 7½d. to 2s. on the reduced dividend, the company having decided to conserve resources despite good financial results. Fisons were 44s., B. Laporte 5s. shares changed hands around 19s., Albright & Wilson were 28s. 9d., and Brotherton 10s shares were 20s. Amber Chemical 2s. shares were 6s., Bowmans Chemicals 4s. shares were 7s., and Ilford strengthened to 24s. 4½d. awaiting permission for the new issue.

Lautaro Nitrate at 37s. 6d. rallied on the company's new process, but British Match receded to 33s. 9d. Iron and steels were lower again, Dorman Long being 29s. 3d., Hadfields 28s. 3d., and Stewarts & Lloyds 53s. 9d. United Steel were down to 26s. Iron and steel shares on the nationalisation list have now declined sharply below their official "take-over" prices.

Boots Drug, after responding further to the good financial results, eased to 49s. 6d. British Drug 5s. shares were 6s 6d. and Beechams deferred 12s. 6d. Sangers were 29s. The 4s. units of the Distillers Co. have kept steady at 25s. 4½d. on the expectation of good financial results. Oils were only slightly lower on balance, Anglo-Iranian being active around £7 9/10 on the financial results which show net profits at a new high record.

## Plastics from Castor Oil

The process for the manufacture of plastics from castor oil is being perfected at the laboratories of the Weizmann Scientific Institute at Rehoboth. A factory for the conversion of the oil is under construction and is expected to produce materials for a full range of plastic processes. Large numbers will be employed in the plantations and new industry. The patents for the invention will be used by the American Plastics Company at Maryland and the Compagnie Organico de Paris.

The institute has also developed the process for extracting the salt from subterranean streams, which will enable millions of cubic metres of water to be used for agriculture in the Negev and Beishan regions.

**E.M.S. Awards.**—Evans Medical Supplies, Ltd., held a two-day conference in Liverpool recently for representatives and indoor staff. At the annual dinner to representatives and managerial staff, Mr. Ian Fergusson, chairman and managing director, presented the Evans Sales Cup to Mr. W. R. B. Sheldon (S.W. Lancs.). The runner-up was Mr. J. P. Cargill, chemists' representative attached to the Evans London house. On June 8, for the sixth successive year, the chairman made long-service presentations to the staff in the principal Merseyside establishments. Among the 16 recipients this year were a director, Mr. C. E. J. Sendall, M.P.S. (40 years' service), and Mr. J. A. Davies (25 years' service), now in charge of the company's Melbourne office. So far, 67 presentations have been made for 40 years' continuous service, and 235 presentations for 25 years' continuous service. The company is to supplement the pensions of employees with a minimum of 25 years' service.

**New Supply for Canada.**—The Canadian Aniline & Extract Company's new plant for the manufacture of mono- di- and triethanolamine was put into production this month. The last named product is immediately available in commercial quantities.

# Prices of British Chemical Products

AN active interest has been reported from most sections of the market and delivery specifications to the chief consuming industries have covered good volumes. Prices generally are steady and such changes as have occurred have been to lower levels. Reductions have already been announced for white lead, zinc oxide, copper sulphate and sulphur and other changes have yet to be notified. Lower quotations are also expected for acetic acid and acetic anhydride which were decontrolled as from June 1. Despite reports of foreign competition, the flow of export inquiry has been of satisfactory dimensions. Business in coal-tar products remain pretty much at recent levels and home consumers have restricted their demands to a minimum. Export prices for cresylic acid, carbolic acid and naphthalene have been reduced.

MANCHESTER.—Trade has proceeded on reasonably steady lines during the past week on the Manchester chemical market. With the exception that in one or two industrial areas the start of the annual holidays last week-end has left its mark on the movement of supplies of textile and other chemicals to the consumers, delivery specifications have been flowing fairly freely and there have been additions to order books on both home and export account. In one or two sections of the market where prices have eased recently, more especially the non-ferrous metal products, buying has been rather more cautious. As usual at this time of the year trading in the market for fertiliser materials has been relatively slow.

GLASGOW.—Demands for coal-tar products in the Scottish chemical market during the past week have continued to show an increase, the call for the pure grades being pronounced. The supply position of most chemicals has been well maintained and a fair volume of business has been transacted over the whole chemical field. Export market conditions have again been quiet.

### Price Changes

**Rises:** Ammonium carbonate, copper carbonate, compound fertiliser.

**Reductions:** Amyl acetate, butyl acetate, butyl alcohol, ethyl acetate, copper chloride, copper nitrate, copper sulphate, lead nitrate, white lead, sulphur, tartaric acid, zinc oxide.

## General Chemicals

**Acetic Acid.**—Maximum prices per ton: 80% technical, 1 ton, £64; 80% pure, 1 ton, £66; commercial glacial 1 ton £79; delivered buyers' premises in returnable barrels: £4 10s. per ton extra; in glass carboys, £7; demijohns, £11.

**Acetic Anhydride.**—Ton lots, d/d, 11¾d. per lb.

**Acetone.**—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over £67 per ton.

**Alcohol, Industrial Absolute.**—50,000 gal. lots, d/d, 2s. 7½d. per proof gallon; 5000 gal. lots, d/d, 2s. 10½d. per proof gal.

**Alcohol, diacetone.**—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums: less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

**Alum.**—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

**Aluminium Sulphate.**—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

**Ammonia, Anhydrous.**—1s. 9d. to 2s. 3d. per lb.

**Ammonium Bicarbonate.**—2 cwt. non-returnable drums; 1 ton lots £40 per ton.

**Ammonium Carbonate.**—1 ton lots: MANCHESTER: Powder, £52 d/d.

**Ammonium Chloride.** — Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

**Ammonium Nitrate.**—D/d, £18 to £20 per ton.

**Ammonium Persulphate.**—MANCHESTER: £5 per cwt. d/d.

**Ammonium Phosphate.**—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

**Amyl Acetate.**—In 10-ton lots, £171 10s. per ton.

**Antimony Oxide.**—£162 10s. per ton.

**Antimony Sulphide.**—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

**Arsenic.**—Per ton, £40 5s. to £41 5s., according to quality, ex store.

**Barium Carbonate.**—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

**Barium Chloride.**—£35 to £35 10s. per ton.

**Barium Sulphate (Dry Blanc Fixe).**—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

**Bleaching Powder.** Spot, 35/37%, £18 10s. per ton in casks (1 ton lots).

**Borax.**—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £27 10s.; powdered, £30; extra fine powder, £31; B.P. crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

**Boric Acid.—Per ton for ton lots in free** 1-cwt. bags, carriage paid: Commercial, granulated, £48; crystals, £53; powdered, £51-£53; extra fine powder, £53. B.P., crystals, £61; powder, £62; extra fine, £64; anhydrous borax, dehydrated borax, £48 per ton in 140 lb. bags.

**Butyl Acetate BSS.**—£149 10s. per ton, in 10-ton lots.

**Butyl Alcohol BSS.**—£145 10s. per ton, in 10-ton lots.

**Calcium Bisulphide.**—£6 10s. to £7 10s. per ton f.o.r. London.

**Calcium Chloride.—70/72%** solid, £8 12s. 6d per ton, in 4 ton lots.

**Charcoal, Lump.**—£25 per ton, ex wharf. Granulated, £30 per ton.

**Chlorine, Liquid.**—£28 per ton d/d in 16/17 cwt. drums (3-drum lots).

**Chrometan.**—Crystals, 5½d. per lb.

**Chromic Acid.**—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

**Citric Acid.**—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

**Cobalt Oxide.**—Black, delivered, 7s. 7½d. per lb.

**Copper Carbonate.**—MANCHESTER: 1s. 6d. per lb.

**Copper Chloride.**—(53 per cent), d/d, 1s. 9d. per lb.

**Copper Oxide.** — Black, powdered, about 1s. 4½d. per lb.

**Copper Nitrate.**—(53 per cent), d/d, 1s. 7d. per lb.

**Copper Sulphate.**—£38 per ton f.o.b., less 2%, in 2-cwt. bags.

**Cream of Tartar.**—100%, per cwt., about £7 8s. per 1-2 cwt. lot, d/d.

**Ethyl Acetate.**—10 tons and upwards, d/d, £103 10s. per ton.

**Formaldehyde.—£31** per ton in casks, according to quantity, d/d. MANCHESTER: £32.

**Formic Acid.—85%, £64** per ton for ton lots, carriage paid. 90%, £67 5s. per ton.

**Glycerine.**—Chemically pure, double distilled 1260 s.g. £123 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

**Hexamine.**—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

**Hydrochloric Acid.**—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

**Hydrofluoric Acid.**—59/60%, about 1s. to 1s. 2d. per lb.

**Hydrogen Peroxide.**—1s. 0½d. per lb. d/d, carboys extra and returnable.

**Iodine.**—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

**Iron Sulphate.**—F.o.r. works, £3 15s. to £4 per ton.

**Lactic Acid.**—Pale, tech., £80 per ton; dark tech., £70 per ton ex works; barrels returnable.

**Lead Acetate.**—White, 120s. to 122s. per cwt

**Lead Carbonate.**—British dry, ton lots, d/d. £131 per ton.

**Lead Nitrate.**—About £116 per ton d/d in casks. MANCHESTER: £95.

**Lead, Red.**—Basic prices per ton: Genuine dry red lead, £111; orange lead, £123. Ground in oil: red, £134; orange, £146. Ready-mixed lead paint: red, lots of 20 gals. and under 160 gals. in 1 gal. tins uncrated, £2 5s. per gal.; orange, 3s. 6d. per gal. extra over the price for red.

**Lead, White.**—Dry English, in 8-cwt. casks, £109 10s. per ton. Ground in oil, English, 50-100 tons lots, £122 10s.

**Lime Acetate.**—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

**Litharge.**—£121 10s. per ton.

**Lithium Carbonate.**—7s. 9d. per lb. net.

**Magnesite.**—Calcined, in bags, ex works, £18 5s.

**Magnesium Carbonate.**—Light, commercial, d/d, £70 per ton.

**Magnesium Chloride.**—Solid (ex wharf), £27 10s. per ton.

**Magnesium Oxide.**—Light, commercial, d/d, £160 per ton.

**Magnesium Sulphate.**—£12 to £14 per ton.

**Mercuric Chloride.**—Per lb., lump, 7s. 4d.; smaller quantities dearer.

**Mercurous Chloride.**—8s. to 9s. per lb., according to quantity.

**Mercury Sulphide, Red.**—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

**Methanol.**—Pure synthetic, d/d, £28 to £38 per ton.

**Methylated Spirit.**—Industrial 66° O.P. 100 gals., 94s. 8d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 11d. per gal.

**Nickel Sulphate.**—F.o.r. works, 3s. 4d. per lb.

**Nitric Acid.**—£24 to £26 per ton, ex works.

**Oxalic Acid.**—£128 to £133 per ton packed in free 5-cwt. casks.

**Paraffin Wax.**—Nominal.

**Phosphoric Acid.**—Technical (S.G. 1.500), ton lots, carriage paid, £61 per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1d. per lb.

**Phosphorus.**—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

**Potash, Caustic.**—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

**Potassium Bichromate.** — Crystals and granular, 9¾d. per lb.; ground, 10¾d. per lb.; for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

**Potassium Carbonate.**—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

**Potassium Chlorate.**—Imported powder and crystals, nominal.

**Potassium Chloride.**—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

**Potassium Iodide.**—B.P., 11s. 1d. to 12s. per lb., according to quantity.

**Potassium Nitrate.**—Small granular crystals, 76s. per cwt. ex store, according to quantity.

**Potassium Permanganate.**—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 6d. per lb.; technical, £7 9s. 6d. to £8 3s. 0d. per cwt.; according to quantity d/d.

**Potassium Prussiate.**—Yellow, nominal.

**Salammoniac.**—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

**Salicylic Acid.**—MANCHESTER: 1s. 11d. to 3s per lb. d/d.

**Soda Ash.**—58° ex depôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.

**Soda, Caustic.** — Solid 76/77%; spot, £19 per ton d/d.

**Sodium Acetate.**—£41-£55 per ton.

**Sodium Bicarbonate.**—Refined, spot, £11 10s. per ton, in bags.

**Sodium Bichromate.**—Crystals, cake and powder, 8d. per lb.; anhydrous, 7¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

**Sodium Bisulphite.** — Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

**Sodium Carbonate Monohydrate.**—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

**Sodium Chlorate.**—£52 to £57 per ton.

**Sodium Cyanide.**—100 per cent basis, 8d. to 9d. per lb.

**Sodium Fluoride.**—D/d, £4 10s. per cwt.

**Sodium Hyposulphite.**—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

**Sodium Iodide.**—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

**Sodium Metaphosphate (Calgon).**—Flaked, loose in metal drums, £103 ton.

**Sodium Metasilicate.**—£19 to £19 5s. per ton, d/d U.K. in ton lots.

**Sodium Nitrate.**—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £20 10s. per ton.

**Sodium Nitrite.**—£29 10s. per ton.

**Sodium Percarbonate.**—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

**Sodium Phosphate.**—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

**Sodium Prussiate.**—9d. to 9½d. per lb. ex store.

**Sodium Silicate.**—£6 to £11 per ton.

**Sodium Silicofluoride.**—Ex store, nominal.

**Sodium Sulphate (Glauber Salt).**—£8 per ton d/d.

**Sodium Sulphate (Salt Cake).**—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

**Sodium Sulphide.** — Solid, 60/62%, spot. £23 per ton, d/d, in drums; broken, £23 15s. per ton, d/d, in casks.

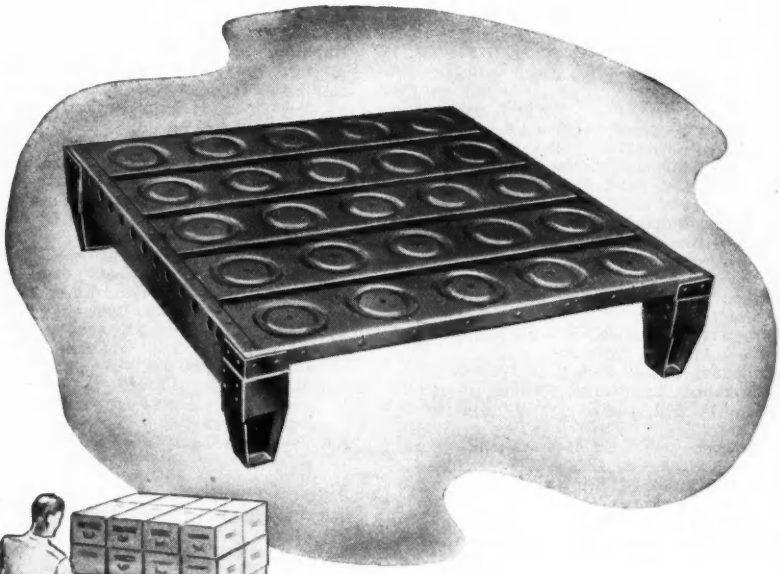
**Sodium Sulphite.**—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

**Sulphur.**—Per ton for 4 tons or more, ground, £13 18s. 6d. to £16 3s. 6d., according to fineness.

**Sulphuric Acid.**—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic free £5 2s. 6d. per ton; 140° Tw., arsenious, £4 15s. per ton. Quotations naked at sellers' works.

**Tartaric Acid.**—Per cwt: 10 cwt. or more £8 10s.; 5 to 9 cwt. £8 12s.; 2 to 4 cwt. £8 14s.; 1 cwt. £8 16s.

**Tin Oxide.**—1-cwt. lots d/d £25 10s. lb. bags), £102 per ton.



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**Titanium Oxide.**—Comm., ton lots, d/d, (56
**Zinc Oxide.**—Maximum prices per ton for 2-ton lots, d/d; white seal, £78 5s.; green seal, £77 5s.; red seal, £75 15s.
**Zinc Sulphate.**—£31 per ton.

### Rubber Chemicals

**Antimony Sulphide.**—Golden, 4s. to 5s. per lb. Crimson, 2s. 7½d. to 3s. per lb.
**Arsenic Sulphide.**—Yellow, 1s. 9d. per lb.
**Barytes.**—Best white bleached, £8 3s. 6d. per ton.
**Cadmium Sulphide.**—6s. to 6s. 6d. per lb.
**Carbon Bisulphide.**—£37 to £41 per ton, according to quality, in free returnable drums.
**Carbon Black.**—6d. to 8d. per lb., according to packing.
**Carbon Tetrachloride.**—£56 to £59 per ton, according to quantity.
**Chromium Oxide.**—Green, 2s. per lb.
**India-rubber Substitutes.**—White, 10 5/16d. to 1s. 5¾d. per lb.; dark, 10½d. to 1s. per lb.
**Lithopone.**—30%, £36 15s. per ton.
**Mineral Black.**—£7 10s. to £10 per ton.
**Mineral Rubber, "Rupron."**—£20 per ton.
**Sulphur Chloride.**—7d. per lb.
**Vegetable Lamp Black.**—£49 per ton.
**Vermillion.**—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

### Nitrogen Fertilisers

**Ammonium Sulphate.**—Per ton in 6-ton lots, d/d farmer's nearest station, in July, £9 16s., rising by 1s. 6d. per ton per month to March, 1950.
**Compound Fertilisers.**—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £10 14s. 6d. I.C.I. Special No. 1, £15 3s. 6d., rising by 2s. 6d. per ton per month to June, 1950. National No. 2 raised from £10 8s. 6d. to £10 18s. per ton, due to increase in potash content, as notified in new Board of Trade Order.
**"Nitro-Chalk."**—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.
**Sodium Nitrate.**—Chilean for 6-ton lots d/d nearest station, £11 per ton.

### Coal-Tar Products

**Benzol.**—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.
**Carbolic Acid.**—Crystals, 11½d per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 10¾d. to 1s. 0½d. per lb., d/d crude, 4s. 3d., naked, at works.
**Creosote.**—Home trade, 6½d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d to 9¾d. per gal.
**Cresylic Acid.**—Pale, 98%, 3s. 9d per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 4d. per gal.
**Naphtha.**—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.
**Naphthalene.**—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.
**Pitch.**—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £8 5s. to £9 5s. per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.
**Pyridine.**—90/140°, 21s. 6d. to 22s. 6d. per gal.; 90/160°, 19s. MANCHESTER: 19s. to 22s. 6d. per gal.
**Toluol.**—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.
**Xylol.**—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

### Wood Distillation Products

**Calcium Acetate.**—Brown, £15 per ton; grey, £22.
**Methyl Acetone.**—40/50%, £56 to £60 per ton.
**Wood Creosote.**—Unrefined, from 3s. 6d. per gal., according to boiling range.
**Wood Naphtha.**—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.
**Wood Tar.**—£6 to £10 per ton.

### Intermediates and Dyes (Prices Nominal)

*m*-**Cresol** 98/100%.—Nominal.
*o*-**Cresol** 30/31° C.—Nominal.
*p*-**Cresol** 34/35° C.—Nominal.
**Dichloraniline.**—2s. 8½d. per lb.
**Dinitrobenzene.**—8½d. per lb.
**Dinitrotoluene.**—48/50° C., 9¼d. per lb.; 66/68° C., 1s.
*p*-**Nitraniline.**—2s. 5d. per lb.
**Nitrobenzene.**—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.
**Nitronaphthalene.**—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.
*o*-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.
*p*-**Toluidine.**—2s. 2d. per lb., in casks.
*m*-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

### Latest Oil Prices

LONDON.—June 22. There is no change in the price of unrefined oils during the 4-week period ending July 2. The price of refined oils also remains unchanged until July 16. (THE CHEMICAL AGE, *60*, 810.)

# Continued Increase in Nitrogen Requirements

## Higher Demand Should Follow Ending of International Control

INCREASE in world uses of nitrogen supplies in 1949-50 compared with the previous year is expected to be in the region of 430,000 metric tons (4.08 million against 3.65 million) or 13¾ per cent.

These estimates, given in the half-yearly report of Aikman (London), Ltd., are of particular interest in view of the cessation of allocation of nitrogen supplies by the Food and Agricultural Organisation at the end of this month.

Consumption in Japan and Korea is expected to rise by 22½ per cent owing to increased allocations from the United States Ordnance factories, while an increase of 17 per cent is estimated in France, where failure to obtain allocations reduced consumption this year by probably 20,000 tons below requirements.

Spain, however, is expected to show the biggest increase, as much as 70 per cent. This is based on the assumption that foreign credits will be obtainable to permit imports of 80,000 tons. Before the civil war, Spain consumed about 120,000 tons, but supplies have since been reduced to about one-quarter of requirements, and under the allocation scheme have never exceeded 45,000 tons annually.

Demand in the U.S.A. is also expected to be higher. Consumption for agriculture, estimated this year at 860,000 tons, would probably have reached 100,000-125,000 tons more, if supplies had been available.

Cost of production in many of the synthetic nitrogen plants in Europe is stated to have risen by 10 to 15 per cent recently, due to higher transit and labour costs.

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*None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.*

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THE Midland Tar Distillers, Ltd., Oldbury, Near Birmingham require CHEMICAL ENGINEERS possessing a Degree in Chemical Engineering or A.M.I. Chem.E. Applicants must have had several years industrial experience in chemical engineering and development work. A first hand knowledge of the oil refining industry an advantage. Full particulars to PERSONNEL MANAGER.

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## WORKING NOTICES

NOTICE IS HEREBY GIVEN that N.V. De Bataafsche Petroleum Maatschappij seek leave to amend the Complete Specification of the Letters Patent No. 616,276 for an invention entitled "A process for manufacturing valuable reaction products of high-molecular unsaturated substances containing more than one unsaturated grouping in the molecule with inorganic acids or acid anhydrides."

Particulars of the proposed amendments were set forth in the Official Journal (Patents), No. 3149, dated June 22, 1949. Any person may give Notice of Opposition to the amendments by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before the 22nd July, 1949.
J. L. BLAKE, Comptroller-General.

THE Proprietor of British Patent No. 481100, entitled "Process for separating soluable and valuable constituents from sylvinite ores and product or products obtained thereby," offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, EHLERT, STERN & CARLBERG, 28 E. Jackson Boulevard, Chicago 4, Illinois, U.S.A.

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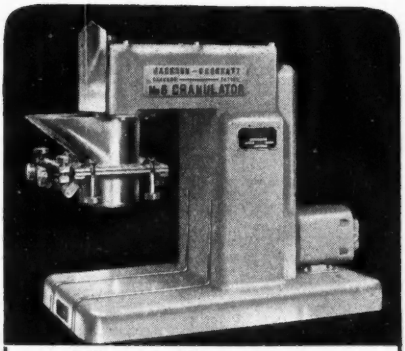


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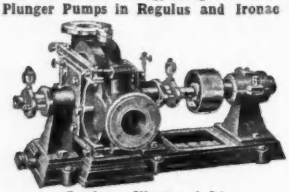

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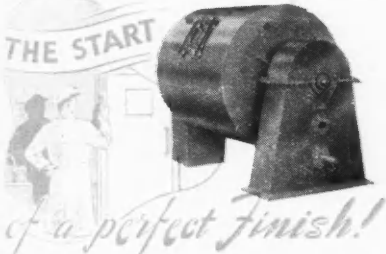


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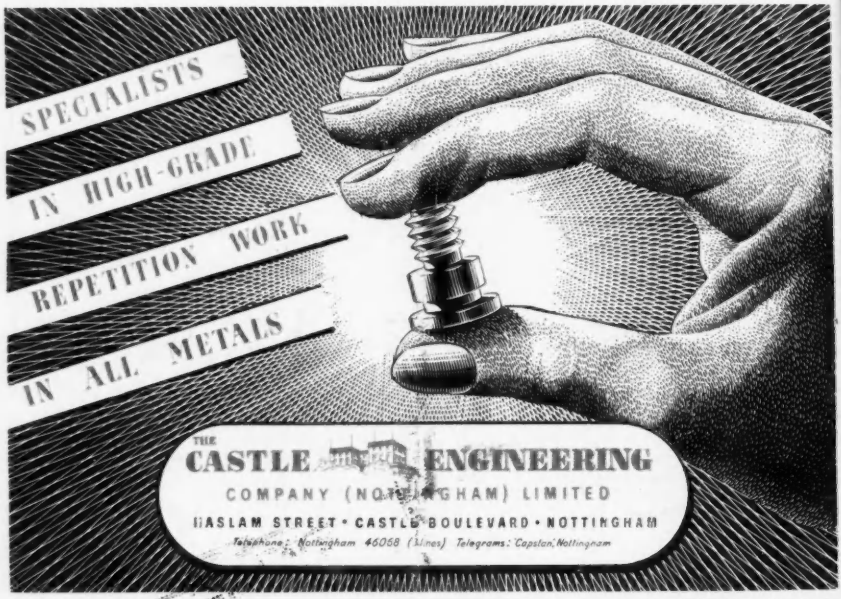


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